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Power Saws May Help Solve Labor Shortage

Demonstration by War Production Board Promises to Relieve Pressing Manpower Problem in Woods—Operation of Waste Liquor Unit to Start This Spring — Other Industrial News.

[FROM OUR REGULAR CORRESPONDENT]

APPLETON, Wis., March 15, 1943—There is hope for a partial solution of the manpower shortage in pulpwood logging through the use of power saws for felling trees in the forests of Wisconsin and adjacent areas. It is estimated that two such power saw crews can replace as many as 100 men in woods operations.

This encouraging news, at a time when dwindling pulpwood stocks are becoming a threat to production, emanates from a demonstration conducted by the War Production Board near Phelps, Wis., last week, arranged by O. T. Swan, secretary of the Northern Hemlock and Hardwood Association. Approximately 250 loggers, timber owners and managers, lumber company representatives and others watched the cutting of 22-inch hardwood trees in one and a half to two minutes, and sawing them into logs in 10 to 20 seconds. Most of the trees were in frozen condition, and the operations were conducted successfully with 23 inches of snow in the woods.

The power saws have small, individual cutting blades which operate in the fashion of a revolving chain. Most are driven by gasoline motors but can also be powered by electricity from portable generators.

These saws are already being used extensively in southern softwood forests and in the pine, fir and redwood areas of the west. They are found just as adept for northern hardwoods. Two men are needed for each sawing unit, plus auxiliary helpers. The machines run in cost from $300 to $3,000 each.

Industrial Accidents Higher

The manpower turnover in paper and pulp mills and in other Wisconsin industries has taken its toll in accidents, according to the annual report of the Wisconsin Industrial Commission. The 33,000 injury cases reported under the workmen's compensation act for the year 1942 formed the largest total for any year since passage of the law in 1911.

Of these, 26,500 were settled with total benefits of more than $5,000,000. In the 32-year history of the law, more than $100,000,000 has been paid out in benefits to more than 500,000 injured employees. Ninety per cent are settled without contest by the payment of conceded liability. The act embraces 34,000 employers and more than 700,000 employees. Several paper mills are among more than 200 employers now self-insured on evidence of financial stability. These represent about 30 per cent of the total industrial payroll of the state.

Operation of Waste Unit to Start Soon

The semi-commercial scale disposal unit erected at Appleton, Wis., by the Wisconsin Sulphite Pulp Manufacturers' Committee on Waste disposal will go into operation this spring, according to announcement made at a meeting of technical representatives of member mills at the Institute of Paper Chemistry Tuesday, March 9. A process developed in cooperation with the institute's research staff will be tried by the new equipment, in the hope of solving the waste sulphite liquor problem, and its accompanying stream pollution evils. Progress of the work was reviewed, and plans for future activity were discussed. The research activities are in their fourth year, and a comprehensive background has now been laid for the handling of this problem.

Pulp Bleaching Co. to Move West

Announcement was made last week that the Pulp Bleaching Company, Wausau, Wis., is moving to Seattle, Wash., which is to be its permanent location in the future.

Raymond P. Hill, president, said the shift was being made partly because the D. J. Murray Manufacturing Company plant, which has been making the machinery, is busy with a heavy schedule of sub-contracted war work. The firm has been operating in connection with the Murray company for the last three and a half years.

Mr. Hill also believes the greatest post-war expansion in the type of industry served by his company is due in the Pacific coast area, and that the removal could be made now with less inconvenience because little equipment is likely to be authorized by WPB for some time.

(Continued on page 44)

Chicago Reports Strong Demand for Paper

Quotations Very Firm at Ceiling Schedule With the Cost Plus Factor Becoming More Serious—Salesmen Will Continue Monthly Golf Outings—Study of "End Uses" of Paper Will Continue.

[FROM OUR REGULAR CORRESPONDENT]

CHICAGO, Ill., March 15, 1943—Further curtailment of pulp, growing shortages of manpower, higher taxes and an unprecedented demand all contrived this week to give Chicago paper trade executives real food for thought. Without doubt, demand has continued strong in all lines while rising costs have plagued those who are experiencing an ever lower margin of profit, if any. All prices are hitting at the ceiling tops with the "cost plus" factor—or the lack of it—assuming more serious consequences daily.

The waste paper market here was having its worries about manpower. Collectors and sorters have moved into war industries or into other more lucrative lines of business. Unless wage stabilization authorities grant some relief to local petitions the waste materials shortage is going to grow more severe.

Markets More Than Firm

In general lines markets were more than firm. Krafts were far behind in filling orders while groundwoods and newsprints, facing threats of further curtailment, were likewise too busy filling orders to count the real cost. Book and cover papers had a real job on their hands proving the real essentiality of their production in war time and had plenty of evidence on hand to demonstrate the need of this type of paper to maintain a civilian economy. Boards were strong. All grades of sulphites were falling more and more behind in the order backlog department.

Promote "End Use" Program

Local paper trade executives indicate that one of the biggest jobs being undertaken locally is a further study of the end uses for paper and paper products. Evidently discussion of this procedure at the N.P.T.A. meetings really registered for associations of local paper groups are trying to squarely face this question of further curtailment of pulp and paper production with some concrete action of their own. The job of fighting against an over all cut all along the line is well under way, according to reports. On the other hand, the program of preparing to show the essential nature of paper and of demonstrating the fundamental need of paper for industries essential to both the war and home front, is getting some results. The procedure, it is understood, is to indicate those types of paper wherein the "end use" is of paramount importance to continuance of the armed force program, to retention of the fundamentals of the educational system, to adequate preparation and distribution of food products, clothing and other civilian esesntials. In this respect, the paper industry is actually joining in with all distribution to show the importance of distribution not only in getting food, clothing and equipment to the 120,000,000 who are not at war but in retaining civilian morale and in spear heading all programs such as selling war bonds and stamps, recruiting drives, scrap drives, et cetera, along the home front.

Salesmen to Continue Golf Outings

The western division of the Salesmen's Association of the Paper Industry is going to continue its golf outings for the 1943 season. This is perhaps bigger news than appears on the face of it, for back of the decision has been a lot of thinking and consideration of pros and cons. It has been decided to drop the May outing but to put the monthly parties on in June, July and August and possibly in September, the latter date depending upon the N.P.T.A. plans for its fall meeting. All outings will be held at clubs close to transportation arteries and the group car system will be utilized to the utmost. As reported, the decision came when the salesmen decided that the outings were helpful in these trying times, in keeping the cooperative nature of the association job at its highest point, and necessary to better performance all along the line.

Herman Berge of the Appleton Coated Paper Company has the job of war time chairman of the Golf Committee. His assistant has not been appointed yet. He's got a big job but is expected to carry on with the usual fine performances credited to his predecessors. The SAPEYES also learned last Monday of the appointment of other chairmen of standing commitees, all of them "repeaters." They are Henry D. Fralich of the International Paper Company, Educational Committee; Ben K. Babbitt as head of the Social Committee, and Joe I. Heyer of the Cherry River Paper Company as head of the Membership Committee.

Discuss Packing Problems

Irving J. Stoller, packing engineer of Bradner Smith & Company, Chicago paper jobbers, was guest speaker at the March 10 meeting of the paper group of the Purchasing Agents' Association of Chicago. The noon meeting was held at the Hotel Sherman and was entirely devoted to a consideration of new materials and methods of packaging for military and civilian needs. Mr. Stoller outlined the problems that had resulted from pulp curtailment on the one hand and increasing demand on the other and, it was reported, evidenced a belief that the paper industry would solve most of its problems with the cooperation and understanding of paper and packing users. A clear understanding of the importance of paper in a war time economy was indicated as a real help in getting full performance in a most trying time.

Plan NPTA Regional Meeting

The Palmer House will be the site of the regional meeting of the National Paper Trade Association to be held in Chicago on April 2. The session is to be one of a series held throughout the country to discuss and review actions taken at the February industry meetings.

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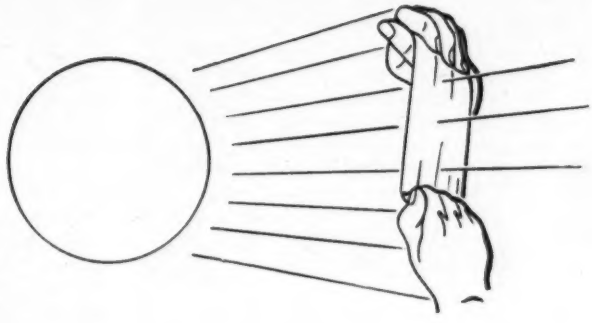

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Government Paper Awards

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., March 17, 1943—Cauthorne Paper Company has been awarded the contract for furnishing the Government Printing Office with 24,100 pounds of chemical wood yellow bond paper at 8.95 cents. Other paper awards recently announced include the following:

Paterson Parchment Paper Company will furnish 2,000 pounds of specially treated tympan paper at 21 cents and D. L. Ward Company will furnish 300,000 pounds of ground wood writing paper at 5.725 cents. Bulkley Dunton & Co. will furnish 600,000 pounds of same at 5.75 cents and same amount of same paper at 5.25 cents. Frank Parsons Paper Company will also furnish 300,000 pounds same at 5.75 cents and 600,000 pounds same at 5.75 cents.

Bermingham & Prosser Company will furnish 600,000 pounds of ground wood writing paper at 4.937 cents and same company will furnish same amount at same price. R. P. Andrews Paper Company will furnish 500,000 pounds of safety sulphite writing paper at 5.74 cents and Paper Corp. of U. S. will furnish 1,500,000 pounds same at 5.92 cents. Whitaker Paper Company will furnish 1,000,000 pounds of same at 5.82 cents and Neely Printing Company will furnish 2,837 pounds of chemical wood white writing paper at $161.97.

Barton, Duer & Koch Paper Company will furnish 500,000 pounds of white chemical wood writing paper at $6.35 per cwt., and Bradner Smith & Co. will furnish 100,000 pounds of antique book paper at $6.86 per cwt. Marquette Paper Company will furnish 34,500 pounds of light weight M.F. book paper at 7.98 cents. D. L. Ward Company will furnish 78,000 pounds of white chemical wood ledger paper at 7.76 cents and Eastern Corp. will furnish 267,000 pounds of white chemical wood ledger paper at 7.91 cents. Walker Goulard Plehn Company will furnish 208,350 pounds of white sulphite writing paper at 7.59 cents and Whitaker Paper Company will furnish 97,536 pounds of 32 x 42 moisture resistant tuff tag at 6 cents and 20,020 pounds of 36 x 34 same at same price.

Walker Goulard Plehn Company will furnish 103,525 pounds of white tracing paper at 11.28 cents and 22,100 pounds same at same price and Paper Corp. of U. S. will furnish 50,000 pounds of super-calendered book paper at 6.84 cents. Marquette Paper Company will furnish 251,250 pounds of gray antique book paper at 7.75 cents and the same firm will also furnish 29,618 pounds of 25% rag, white bond paper at 12.08 cents and 45,248 pounds at same price.

Marquette Paper Company will also furnish 168,568 pounds of white chemical wood writing paper at 7.60 cents and the same firm will also furnish 35,190 pounds of white offset book paper at 7.37 cents. Whiting Paper Company will furnish 138,395 pounds of white 25% rag, bond paper at 14.5 cents and Barton, Duer & Koch Paper Company will furnish 1,750 sheets of white waterproof ledger paper at $40.00 per C sheets.

Wilcox-Walter-Furlong Paper Company will furnish 80,000 pounds of white chemical wood ledger paper at $7.15 per cwt., and Eastern Corporation will furnish 200,000 pounds of white sulphite writing paper in 38½-inch rolls at 6.81 cents and 45,000 pounds of same in 24-inch rolls at the same price. The Paper Corporation of U. S. will furnish 300,000 pounds of super-calendered book paper at 6.84 cents and the R. P. Andrews Paper Company will furnish 4,000 pounds of 28 x 38 Quaker drab antique finish cover and 3,200 pounds same 24 x 36 at $722.71.

The Whitaker Paper Company will furnish 4,100 pounds of 28 x 38 Quaker drab antique finish cover paper at 8.66 cents; 3,320 pounds of same 24 x 36 at 8.66 cents; 4,100 pounds 28 x 38 same at 9.57 cents; and 3,320 same 24 x 36 at 9.57 cents. Walter Goulard Plehn Company will furnish 13,000 pounds of white chemical wood manila manifold at 10.75 cents.

Stanford Paper Company will furnish 7,800 pounds of 50% rag, lithograph finish map paper at 14.5 cents; 7,800 pounds same at 13.75 cents; and 7,800 pounds same at 14.5 cents and Bermingham & Prosser Company will furnish 222,000 pounds of 25% rag, white mimeograph paper; 100,000 pounds at 8.86 cents and 122,000 pounds at 9.04 cents. Stanford Paper Company will also furnish 6,750 sheets of three English finish gummed paper at $504.50.

Eastern Corporation will furnish 354,900 pounds of white sulphite writing paper at 6.75 cents. Marquette Paper Company will furnish 408,000 pounds of white book paper at 7.61 cents; also same company same amount at 7.19 cents; same company same amount at 7.40 cents. Walker Goulard Plehn Company will furnish 115,000 pounds of offset book paper at 8.52 cents; also same company same amount at 8.52 cents; and same company, same amount at 7.67 cents; and same company same amount at 8.29 cents. Marquette Paper Company will furnish 62,400 pounds of 25% rag, white bond paper No. 32 at 13.05 cents.

Marquette Paper Company will furnish 62,400 pounds of 25% rag, white bond paper at 12.75 cents. Whitaker Paper Company will furnish 46,000 pounds same at 13.36; same company 57,400 pounds same at 13.09 cents; also 46,000 pounds same at 12.39 cents; 62,400 pounds same at 12.39 cents. The same company will also furnish 46,000 pounds same at 13.02 cents. Walker Goulard Plehn Company will furnish the following: 57,400 pounds of 25% rag, white bond paper at 12.58 cents; 57,400 pounds at 12.03 cents; 259,000 pounds of white sulphite writing paper at 7.74 cents and the North American Pulp and Paper Company will furnish 100,000 pounds of white chemical wood at $7.50 per cwt. The Eastern Corporation will furnish 80,708 pounds of yellow chemical wood writing paper at 7.30 cents and 107,992 pounds same white at 6.60 cents.

Walker Goulard Plehn Company will furnish 200,000 pounds of poster paper at 7.29 cents; R. P. Andrews Paper Company 300,000 pounds same at 7.25 cents. Marquette Paper Company will furnish 36,500 pounds of tan bristol cover paper at 10.60 cents and 29,700 pounds same at 10.60 cents. Same firm will also furnish 29,700 pounds same at 10.20 cents and 36,500 pounds same at 10.20 cents. Same company will also furnish 29,700 pounds same at 10.40 cents and 36,500 pounds same at 10.40 cents. R. P. Andrews Paper Company will furnish 4,125 sheets of red glazed paper at $21.78 per M sheets and Eastern Corp. will furnish 45,000 pounds of white chemical wood writing paper at $6.98 per cwt.

This Year Rubber Is Tapped from Test Tubes

Synthetic Rubber Already Is Working for Users of Mechanical Rubber Goods

War production is up threefold. But the vital rubber stock pile is dwindling fast. This is the year of crisis in rubber.

There is only one solution . . . the production of synthetic rubber in steadily increasing tonnages . . . synthetic rubber to take over jobs once handled by natural rubber . . . to perform new tasks, serve in new applications created by wartime need.

One of the first synthetic rubber plants in the Government's program was built and is being operated by United States Rubber Company . . . another soon will be in production.

Our engineers have been working with synthetic rubber since 1921. During this period they have learned that no one synthetic should be used for all types of mechanical rubber goods. They have found where and how synthetic is superior to natural rubber, where it is equally as good, where it falls short. They know what uses each of the five basic commercial types of synthetic rubber is best suited for — Neoprene, Buna-S, Buna-N, Butyl, or Thiokol—and how to compound the specific synthetic rubber for the specific task. U. S. Rubber has used all five types and knows which one to select for the performance required.

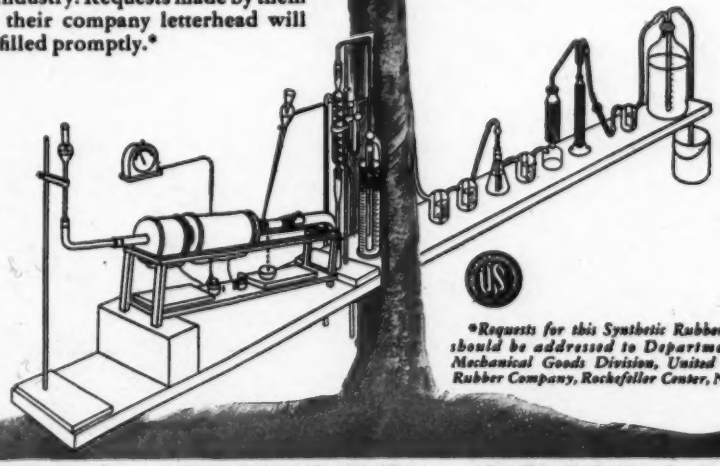
Information based on the results of vast experiments and practical applications of synthetic rubber has been incorporated in a new comprehensive book, *The Five Commercial Types of Synthetic Rubber.*

This informative book traces the history of synthetic rubber from the earliest experiments of Michael Faraday to the present. It discusses each of the basic types of synthetic rubber, tells where it has been used successfully in United States Rubber Company products, and compares its properties with natural rubber. It tells how synthetic rubber is made. It is a detailed answer to the most vital question of the day.

We feel that *The Five Commercial Types of Synthetic Rubber* is a publication of real importance to men of industry. Requests made by them on their company letterhead will be filled promptly.*

The successful use of synthetic rubber in mechanical rubber goods and the insurance of fully dependable service depend largely upon the skill of the manufacturer and compounder. Each of the five basic commercial types of synthetic permits a myriad of variations.

The United States Rubber Company has been developing and improving rubber products for one hundred years. Today, the same vast resources for research and development that resulted in some of the most spectacular achievements in the rubber industry are being devoted to the problem of synthetic rubber. A great backlog of knowledge already has been built. More is being constantly added.



**Requests for this Synthetic Rubber Book should be addressed to Department 12, Mechanical Goods Division, United States Rubber Company, Rockefeller Center, N. Y. C.*

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Crossett Companies Make the News

"Public opinion often decides the issue," it has often been said. If so, the Crossett Companies, manufacturers of lumber, paper, and chemicals at Crossett, Ark., are in the clear. Following are recent excerpts from the press in which Crossett has made news.

From London on February 9 came a U.P. dispatch saying—"Pvt. Dewey Curtis of Crossett, Ark., barred Lieut. Gen. Frank A. Andrews, commanding general of the American forces in the European theater from his own room at the United States headquarters Tuesday and was commended for it. 'I've been given a list of officers who may be admitted to this room and your name is not on it, sir,' Curtis told the general. The sergeant of the guard was called and he issued a verbal order to permit General Andrews to pass. Curtis was commended for his obedience of orders."

Crossett Companies received recognition this month along with many other corporations in the United States for having sent parcels to some four hundred former employees who are now in the Armed Forces. The "Liberator" parcel, containing several dollars worth of morale-building material, was shipped through Parcels for the Forces Incorporated, New York City.

Who should be picked for the pilot of the President's plane which flew safely to Africa, Brazil and home but a Crossett son. Captain Howard Maurice Cone, Jr., who was born at Crossett in April, 1908, flew our chief executive on his vastly important mission. Don't believe it when we say that Crossett's name didn't appear in print when this news could be publicly told.

In a story in the current issue of "Yank," the official Army newspaper-magazine, Pvt. Easter L. Rice of Crossett, Ark., is pictured in his woodskins while on duty at Camp Hale, Colorado. Camp Hale is the training base for mountaineer troops (Russian style) where the first of the United States units was activated, and is noted for its snowy valley.

Most recent of Crossett's press claims concerned a printed service letter which those modern manufacturers are preparing monthly in "homey style" for the soldiers, sailors, marines and uniformed women who formerly worked at Crossett. The press said, "Crossett's Service Men's Letter, signed by 'Uncle Oakley and Aunt Piney,' is one of the first of its kind to appear from a forest products center and probably one of the first few in any industry in the United States."

Paper Sales Show Decline

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, March 17, 1943—Wholesalers' sales and inventories reported by the Department of Commerce based on figures of 88 firms in paper and paper products, showed a decline of 24 percent for January 1943 against the same month a year earlier for sales. They declined 4 per cent in January this year compared with December, 1942.

Inventories gain 1 percent in January this year against the same month a year ago, and lost 1 percent between January this year and December 1942. Collections were 84 percent in January this year, compared with 76 percent in January 1942, and 82 percent in December 1942.

Photoelectric Reflection Meter

The recently announced Photovolt photographic reflection meter, Model 610-B, manufactured by the Photovolt Corporation, 95 Madison avenue, New York, is suited for measuring paper brightness as well as opacity and gloss. It is also useful for determining color specification and for color matching.

In the application of the reflection meter for paper brightness tests, the readings obtained are said to approximate brightness values as defined by TAPPI. No additional accessories are required for opacity tests. Gloss measurements are taken with a special search unit registering 75 degrees specular reflection.

The instrument is self-contained within a portable wooden case, with cover and carrying strap, is of rugged construction and requires no special care in use. It consists of two units: the search unit containing the photocell and the instrument proper, containing the controls and indicating instrument. The meter may be operated from the AC power line or from a storage battery.

Further details of this instrument may be obtained from the manufacturer.

Hercules Opens Boston Sales Office

Hercules Powder Company will open sales offices in Boston on April 1, for its cellulose products, naval stores, synthetics, explosives and paper makers chemical departments. The offices are on the seventh floor of the Statler Office Building.

Homer C. Simmons, New England manager of sales of the cellulose products department, who is now at Stoneham, Mass., will head his departmental unit in Boston.

Howard C. Bates, in charge of synthetics department sales for that territory, will be located in the Boston office.

W. M. Williams, the newly-appointed resident manager of the paper makers chemical department's plant at Stoneham, will also head the industrial division sales group of the PMC department in Boston.

G. J. Rising, former resident manager at Stoneham, will be transferred to the Hercules office in Pittsburgh, Pa., where he will represent the industrial chemical division.

H. M. Lester Elected Vice President

At a meeting of the Board of Directors of the Fitchburg Paper Company held in Fitchburg, Mass., Howard M. Lester was elected vice president in charge of converted papers. Mr. Lester will maintain his headquarters at the Decotone Division of the Fitchburg Paper Company in Fitchburg, Mass.

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b) Insist on getting liquid chlorine that is uniform and free from unwanted impurities, and comes to you in containers that best meet your requirements. In this way you can make full use of every ounce of your supply.

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CONSTRUCTION NEWS

Under limitations order L-41 all projects involving expenditures of more than $5,000 must be specifically approved by the War Production Board. The status of projects reported herewith under the provisions of the order is not known.—EDITOR.

Marinette, Wis.—The Martindale Pulp Wood Insulation Company, foot of Church street, has tentative plans under advisement for rebuilding of mill, recently destroyed by fire. Estimates of cost are being made. H. E. Martindale is general manager.

New York, N. Y.—The Shuttleworth Carton Company, Inc., has been organized with capital of 200 shares of stock, no par value, to manufacture paper boxes and containers of various kinds. New company will take over and succeed to concern of same name, with local plant at 474 West Broadway.

St. Paul, Minn.—The Waldorf Paper Products Company, Box Division, 2236 Myrtle avenue, manufacturer of folding paper boxes and containers, is awarding miscellaneous contracts for work in connection with alterations and improvements in plant, previously referred to in these columns, including award to Healy Plumbing & Heating Company, 278 West Kellogg boulevard, St. Paul, for plumbing work. Program is scheduled for completion at early date. No estimate of cost announced. Dunnigan Construction Company, Oppenheim Building, Minneapolis, is general contractor.

Brooklyn, N. Y.—Fire recently damaged the three-story building of Academy Waste Paper Company, 131 Third street, used in part as a paper-bag manufacturing plant and remainder for storage and distribution. The interior of structure was practically destroyed. No estimate of loss announced. Plans for rebuilding are under consideration.

Chester, Pa.—The Scott Paper Company, manufacturer of tissue paper stocks, has developed a number of special paper products for federal service in cooperation with the Government, and will give over part of mill production to these new specialties.

South Attleboro, Mass.—The Rhode Island Card Board Company, Pawtucket, R. I., manufacturer of kraft, news and other paper stocks, has plans under way for rebuilding of plant at South Attleboro, destroyed by fire several weeks ago with loss reported over $150,000, including equipment. It is proposed to ask bids soon on general erection contract.

Altadena, Calif.—The United Fiber Corporation, recently organized with capital of $300,000, is said to have plans under way for a new mill in this vicinity for the manufacture of a line of fiber products. W. D. Higgins, Altadena, is one of heads of new organization.

Wisconsin Rapids, Wis.—The Consolidated Water Power and Paper Company, manufacturer of coated and other paper stocks, is asking bids for finished materials for new addition to mill, now under way, previously referred to in these columns, including fire doors, etc. The new unit is located at the Ahdawagam Paper Products Division of the company, 800 Fremont street. It will be equipped as a press building, with cost reported over $75,000, including machinery.

Newark, N. J.—The Lathrop Paper Company, Inc., 50 East Peddie street, commercial paper products, will remove local headquarters at early date from address noted to Industrial Office Building, 1060 Broad street. The East Peddie street building has been leased to Goodyear Tire & Rubber Company, for its local branch.

Cleveland, Ohio—The Industrial Rayon Corporation, 9801 Walford avenue, manufacturer of viscose rayon products, has superstructure under way for new addition to mill, recently referred to in these columns, and will push work to early completion. A priority rating has been secured. Alterations and improvements also are being made in present mill. The George A. Rutherford Company, 2725 Prospect avenue, Cleveland, has the general erection contract. Wilbur Watson and Associates, 4614 Prospect avenue, Cleveland, are architects.

Toronto, Ont.—The Gair Company Canada, Ltd., 372 Bay street, manufacturer of paper boxes and containers, is maintaining a full production schedule at local mill, with large working quota in all departments. The company reports that during the year just closed, 1942, approximately $105,000 was expended on capital additions to plant, while improvements, maintenance and repairs cost about $300,000 in that period.

Montreal, Que.—The Shawinigan Water and Power Company, Ltd., Montreal, which furnishes power service to a number of pulp and paper mills in its territory, is planning expansion in its No. 3 electric generating station, including installation of equipment for increased capacity. Proposed to carry out work soon.

Must Set Aside Reserves

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., March 17, 1943—Manufacturers of paper and paper board are required to set aside, each month, a reserve of Class B items paralleling reserve production of Class A items, under the terms of General Conservation Order M-241 as amended.

The order as previously amended January 8 directed each manufacturer to reserve, each month, two per cent of his quota of paper and paper board for the calendar quarter within which the month fell, subject to disposition by the Director General for Operations in order to meet emergency orders necessary to war or essential civilian activity.

Since the only items which have a quota are those falling under Class A (production of Class B items is unrestricted, and, therefore, those items have no quota), the reserve production clause could not be applied to items under Class B.

The order as amended corrects the Reserve Production clause by deleting the word "quota" and substituting the words, "potential production," in order that a portion of the production of Class B items may also be held for disposition subject to WPB orders.

FINANCIAL NEWS

New York Stock Exchange

High, Low and Last for Week Ending March 13, 1943

STOCKS

	High	Low	Last
A. P. W.	2⅜	2⅛	2⅜
Armstrong Cork Co.	34¼	33	33¾
Celotex Corp.	12	11¾	11¾
Celotex Corp., pf.	87⅛	85	86
Certain-Teed Products Corp.	5½	4¾	5⅛
Certain-Teed Products Corp., pf.	48	45½	48
Champion Paper & Fibre Co.	19	18½	18⅝
Champion Paper & Fibre Co., pf.	105	104	104
Congoleum Nairn Co.	19½	18¾	19
Container Corp. of America	21⅞	21	21⅞
Continental-Diamond Fibre Co.	12⅝	12	12⅜
Crown-Zellerbach Co.	13⅝	13¼	13½
Crown-Zellerbach Co., pf.	90½	88⅞	89
Dixie-Vortex Co.	13¾	11¾	13¾
Dixie-Vortex Co.—A.	39	38⅞	39
Flintkote Co.	19¼	17⅝	19
Robert Gair	3½	3	3⅛
Robert Gair, pf.	12⅝	12¼	12⅝
International Paper Co.	11½	10⅝	11⅛
International Paper Co., pf.	58⅛	56⅛	58
Johns-Manville Corp.	81¾	79	81
Johns-Manville Corp., pf.	....	....	....
Kimberly-Clark Corp.	27½	27¼	27½
MacAndrews & Forbes	23	22⅜	23
MacAndrews & Forbes, pf.	....	....	....
Masonite Corp.	37	36¼	36¾
Mead Corp.	9⅛	8¾	8¾
Mead Corp., pf.—A. 6%	88	86	88
Mead Corp., pf.—B. 5½%	....	....	....
Paraffine Companies, Inc.	41⅞	39½	41⅞
Paraffine Companies, Inc., pf.	....	....	....
Rayonier, Inc.	13¼	11⅜	13
Rayonier, Inc., pf.	29¼	28	29¼
Ruberoid Co.	22⅞	22	22⅛
Scott Paper Co.	40½	40	40½
Scott Paper Co., pf.	110½	110½	110½
Sutherland Paper Co.	30	29¾	30
Union Bag & Paper Corp.	10⅝	9⅞	10¼
United Paperboard Co.	5	4⅝	5
U. S. Gypsum Co.	66	62	65¾
U. S. Gypsum Co., pf.	....	....	....
West Virginia Pulp & Paper Co.	15	14	14

BONDS

Abitibi Pulp & Paper Co. 5s '53	....	....	....
Celotex Corp. 4½s '47	102⅛	101¾	102
Certain-Teed Products Corp. 5½s '48	98	95	95½
Champion Paper & Fibre Co. 4½s '50	....	....	....
International Paper Co. 6s '55	106½	106½	106¾
International Paper Co. 5s '47	104	103⅞	104
Mead Corp. 3¼s '55	....	....	....
West Virginia Pulp & Paper Co. 3s '54	104¼	104¼	104¼

New York Curb Exchange

High, Low and Last for Week Ending March 13, 1943

STOCKS

	High	Low	Last
American Box Board Co.	6¼	5¾	6¼
Brown Co., pf.	....	....	....
Great Northern Paper Co.	34½	34	34½
Hummel-Ross Fibre Corp.	4⅝	4½	4½
National Container Corp.	11¾	10⅞	11⅛
St. Regis Paper Co.	3	2¾	2⅞
St. Regis Paper Co., pf.	124¼	123¼	124¼
Taggart Corp.	3⅞	3¾	3⅞

BONDS

American Writing Paper Co. 6s '61	91⅛	91	91

Donnacona Increases Profit

MONTREAL, Que., March 15, 1943—The statement of the Donnacona Paper Company for 1942 shows net profit at $105,837, as compared with $104,655 for 1941. During the year there was an expansion of some $535,000 in net working capital to $1,872,000. Funded debt was cut by $386,500, bank loans by $301,000, while Dominion Government bonds to an amount of $175,000 were acquired. Reviewing 1942 President Robt. P. Kernan states that "With the exception of newsprint, an excellent demand for the various products manufactured in the company's plant continued during the year. . . . During 1942, the company's machine shop was extended and additional mechanics employed in producing war materials."

Gair Co. Earns $707,191

The Robert Gair Company, and United States subsidiaries—For 1942 reports a net profit after charges was $707,191, after deducting $259,896 for interest on income notes and $1,690,435 for Federal income and excess profits taxes. Accruals for Federal income and excess profits taxes, according to company's report, were 71% of income in 1942, compared with 54% in 1941. Net working capital on Dec. 31, 1942, was $3,203,600, an increase of $1,206,000 in the year.

Ruberoid Co. Nets $1.98

The Ruberoid Company for 1942, reports a net profit of $788,288, equal to $1.98 a share, compared with $1,563,099, or $3.93 a share, the year before. Federal income and excess profits taxes amounted to $2,597,469, compared wtih $1,365,455 in 1941. Net sales of $29,456,576 were largest in its 56-year history and $3,677,915 larger than the previous year.

St. Helens Earns $1.98

The St. Helens Pulp and Paper Company reports for the year ended December 31, 1942, net profit $396,127 after all prior charges and including post-war tax credit of $78,127, equal to $1.98 a share on the 199,934 shares common stock outstanding. This compared with a net profit of $481,651, or $2.41 a share in 1941.

Glatfelter Co. Nets $194,308

The P. H. Glatfelter Co. reports for 1942, net income after all charges, including Federal, State, Municipal taxes, and contingency reserve, amounted to $194,308.53 as compared with $271,820.19 earned in 1941. The charge for contingency reserve for post-war adjustments was $100,000.

Munising Nets $2.55

The Munising Paper Company for the year to January 2, reports a net income of $394,315, equivalent to $2.55 a share on 135,074 common shares, compared with $268,467 or $1.62 a share in year to January 3, 1942.

Eddy Paper Co. Loses

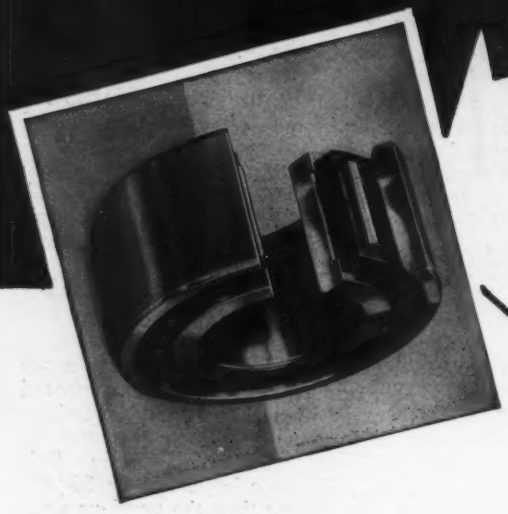
The Eddy Paper Corporation for 1942, reports net income, after $1,555,000 Federal income and excess profits taxes, was $475,408, against 1941 net of $833,344, or $1,400,000 taxes; net sales, $13,257,112, against $14,971,775.

Kimberly-Clark Nets $3.25

The Kimberly-Clark Corporation, Neenah, Wis., reported a net profit on common stock for the year 1942 of $1,587,662.50, equal to $3.25 per share, compared with $4.72 for the previous year.

Net sales for the year were $41,163,622.45 and

Longer Life for Every Bearing *Because:*



All ROLLWAY RADIAL BEARINGS are Free from Thrust Loads

All ROLLWAY THRUST BEARINGS are Free from Radial Loads

PILE a thrust load on a roller bearing that's already carrying a radial load and you introduce complex stresses that tend to force the rollers from the race . . . that tend to increase sliding friction and wear-back between the roller ends and the radius of the race . . . and that tend to cause earlier fatigue failure.

That's why Rollway Solid-Cylindrical Roller Bearings split every load into its two simplest components of *pure* radial and *pure* thrust . . . carrying each of these on separate roller assemblies at RIGHT ANGLES TO THE ROLLER AXIS. Both torque per bearing and load per roller are substantially reduced. You get greater roller cross-section and greater roller contact area per unit of load, hence more strength to meet stress, and less hazard of spalling and brinelling the race.

You can usually change over from other bearings to Rollways of higher load capacities without increasing boundary dimensions. But, for maximum life and service, your bearings should be carefully chosen as to size and type. Send us your drawings, or a description of your application, for free and confidential bearing recommendation.

For longer bearing life, more efficient performance and more economical maintenance . . .

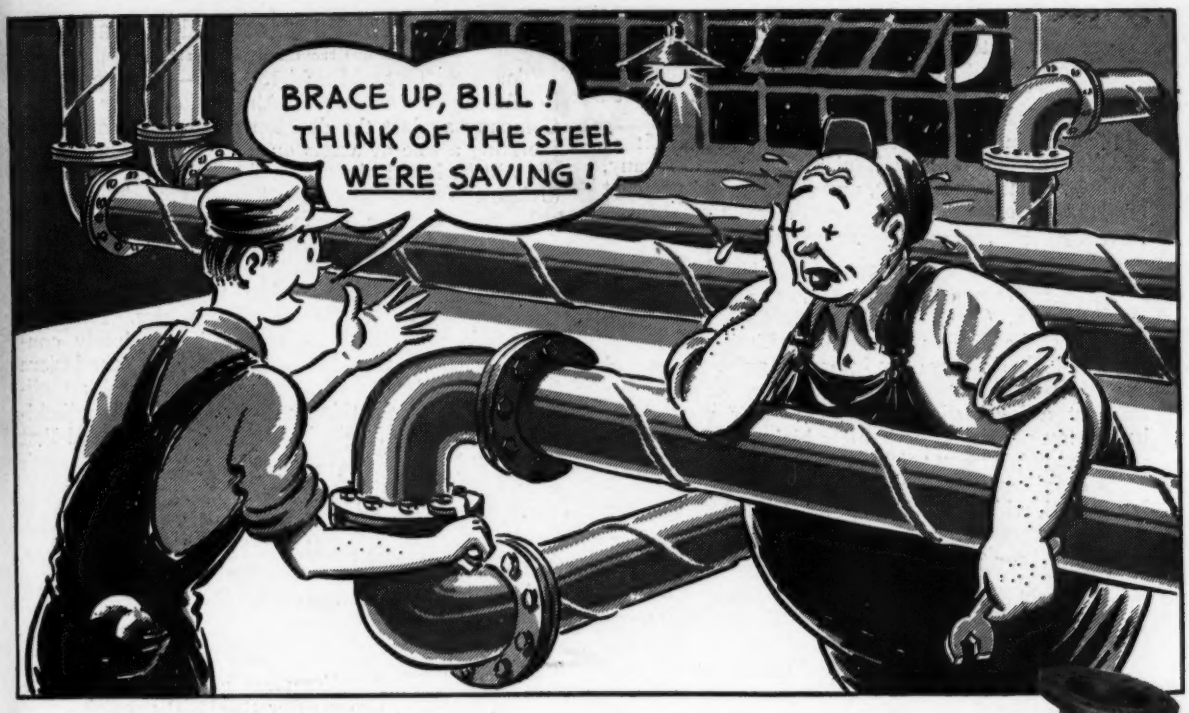
FOLLOW THIS BASIC BEARING PRINCIPLE

- All radial loads carried at right angles to the roller axis.
- All thrust loads carried at right angles to the roller axis.

ROLLWAY BEARING COMPANY, INC., SYRACUSE, N.Y.

BUILDING HEAVY-DUTY BEARINGS SINCE 1908

BEARINGS



And think of the dollars saved, too

YES, every time you can use Taylor Spiral Pipe for one of those jobs where heavier pipe has been used in the past, you conserve steel and cut costs!

And you won't have to look very far for an application for Taylor Spiral Pipe either. Listed opposite are a few of the services that have been satisfactorily and economically handled by Taylor Spiral Pipe for many years. And a full list would include many more uses. In most plants Standard Thickness Pipe is largely used for such services. It seems to have been a sort of tradition of industry to specify this heavier-than-necessary pipe for ordinary, everyday uses of this kind.

But more and more plants are breaking away from the heavy-pipe habit. They are finding that it pays real dividends—that light but strong Taylor Spiral Pipe can satisfactorily handle a big percentage of the jobs ordinarily assigned to Standard Thickness Pipe—that in many cases its installed cost is no more than half that of the heavy pipe it so well replaces.

Switching to Taylor Spiral Pipe for services like those listed is made practical by the range of sizes and variety of fittings. Thicknesses range from 18 to 6 gauge; joint lengths to 40 ft. All types of end joints, all kinds of fittings and "specials" or fabricated assemblies are produced, providing a complete service with undivided responsibility.

Change to TAYLOR SPIRAL PIPE FOR:

- High and Low Pressure Water Lines.
- Low Pressure Steam and Air Lines.
- Steam and Diesel Exhaust Lines.
- Vacuum and Suction Lines.
- Blower Piping.
- Sand and Gravel Lines.
- Industrial Gas Lines.
- Oil and Gas Gathering Lines.
- Swing Pipe.
- Spray Pond Piping.
- Hydraulic Mining.
- Dredge Lines.

TAYLOR FORGE & PIPE WORKS General Offices & Works: Chicago. P.O. Box 485
New York Office: 50 Church Street • Philadelphia Office: Broad Street Station Building

TAYLOR *Spiral* PIPE

the net profit, before federal income taxes and reserves was stated as $5,161,841.97. Federal taxes are estimated at $2,840,000, including $1,640,000 excess profits tax. The provision for common stock dividends was $597,780.

Included in the report was an estimated profit of $53,990 for the William Bonifas Lumber Company, a wholly owned subsidiary, and a loss of 60 per cent or $40,389 for the North Star Timber Company.

Frazer Companies Profits Off

[FROM OUR REGULAR CORRESPONDENT]

MONTREAL, Que., March 15, 1943—The annual report of the Fraser Companies, Limited, of Edmunston, N. B., large producers of pulp, paper and lumber, shows consolidated operating earnings for 1942 at a level slightly under a year ago, profit before tax provision moderately higher at $2,549,368 as compared with $2,432,948, and an improvement of approximately $1,500,000 in consolidated working capital, which at December 31 stood at $5,165,000.

Great Northern Nets $1.69

The Great Northern Paper Company for the twelve months ended December 31, 1942, reports a net income of $1,686,528, after taxes and charges, equal to $1.69 a share on 997,480 common shares; year ago, $2,432,261 and $2.44 a share.

Restigouche Co. Profits Up

The Restigouche Company for 1942, reports net income, Canadian currency, amounted to $387,813, compared with $356,906 in 1941.

To Hear Abitibi Case End of March

[FROM OUR REGULAR CORRESPONDENT]

TORONTO, Ont., March 13, 1943—The appeal on behalf of shareholders of Abitibi Power and Paper Company against the decision of Ontario courts authorizing a sale of assets on behalf of the bondholders will be heard about the end of March, according to latest reports from London.

In the meantime, the auditors are working on the financial statement of Abitibi for the year 1942. Various estimates are made of net working capital to be shown and these reach as high as $20,000,000. Commenting on the company's affairs, Financial Counsel says: "Inquiries among those closely connected with the company suggest that the case before the privy council would not be considered an obstacle in making a third cash payment to bondholders, on account of principal. It will be recalled that an amount of $6,274,710, at the rate of $130 for each $1,000 bond was made in 1941, with a further payment of $4,826,700 on April 15, 1942, a total of $11,101,410, representing $230 on each $1,000 principal amount. The proceeds of the sale of Espanola, at a price indicated at over $1,000,000, would improve still further the net working capital position."

Dixie-Vortex Earns $2.37

The Dixie-Vortex Company and subsidiaries for 1942, report net profit after $200,000 provision for war contingencies and $2,349,987 for Federal income and excess profits taxes after post-war credit, was $957,552, or $2.37 a common share. This compares with 1941 net, after $1,120,153 taxes, of $933,702, or $2.40 a common share.

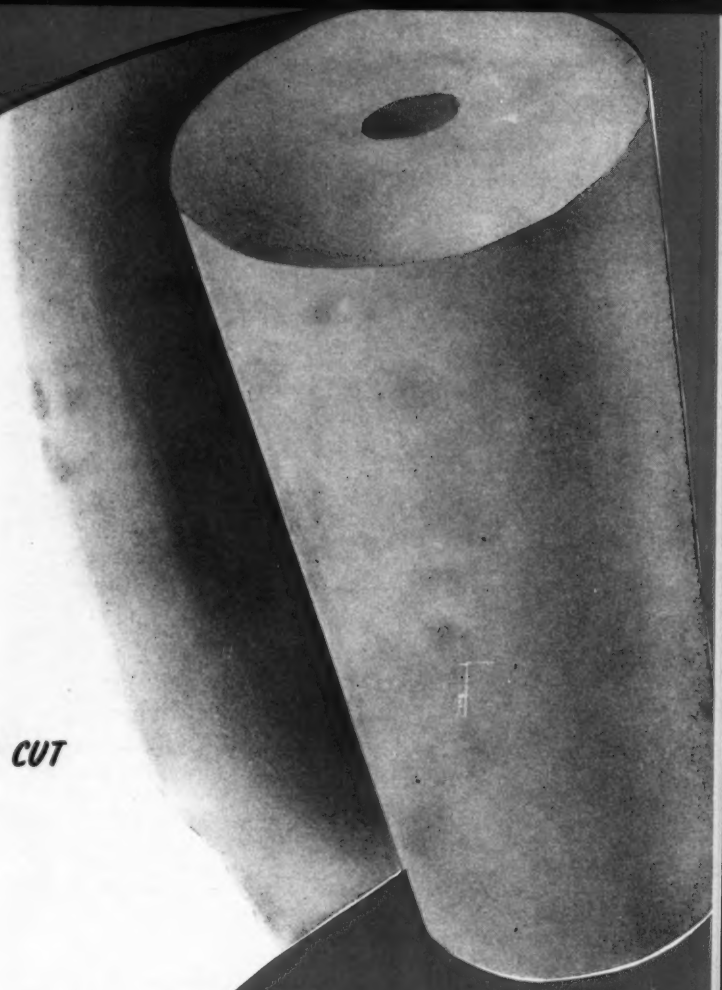
We're in it for the duration

SINCE 1828
We have served the industry well, with the finest in Paper Mill Machinery.
NOW
our entire manufacturing facilities are engaged in turning out material for the mightiest and most formidable fighting machine our country has ever known.
While we cannot give you typical peacetime SW Service, we can supply you with replacements — under proper priority rating, of course.

THE SMITH & WINCHESTER

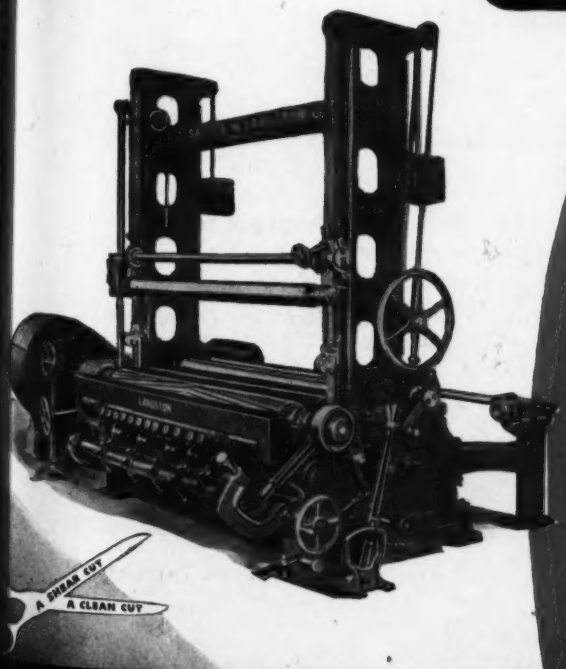
MANUFACTURING COMPANY

PLANT AND OFFICES AT SOUTH WINDHAM, CONNECTICUT



from paper or board of any grade,
the Langston SHEAR CUT assures a CLEAN CUT
and "custom-tailored" finished rolls.

LANGSTON
Slitters and Roll Winders



Surface or Drum Winding, and Shear Cut are time-tested Langston features. You get a tight start, a good finish and a roll of uniform density. Langston Slitters and Roll Winders are accurately machined and balanced for high-speed operation. They deliver exceptional performance with low maintenance. A type and size for every job.

SAMUEL M. LANGSTON CO., Camden, N. J.

Calls Newsprint Price Too Low

[FROM OUR REGULAR CORRESPONDENT]

MONTREAL, Que., March 15, 1943—The question of the price of newsprint is still a dominant one in the industry here, the contention being that the increase of $4 per ton recently authorized is by no means enough to compensate producers for the steadily increasing costs. Regret is expressed that, through no fault of the Canadian mills, the issue has been beclouded by political issues and by administrative changes in the United States controls. Thus the *Financial Times* of Montreal says:

"The fact that the mills no longer can negotiate directly wtih newsprint consumers or their representatives, but must consider the opinion of political quarters which alone have authority over prices, has complicated problems in connection with ironing out differences and eliminating unfairnesses in price and supply situations.

"As an instance, it is probable that the price increase, recently authorized to extent of $4 a ton effective March 1, would have been approved earlier had not there been a change in U. S. price control administration.

"Much work had been done in supplying information to Washington price control authorities; then came the change in administration with Leon Henderson resigning as U. S. price administrator and Prentiss Brown being appointed to take up old problems from scratch.

"At the same time, the Government control position has tended to place newsprint users and producers on opposite sides of the fence. In effect, the Government has been a court of decision, with newsprint mills and publishers in position of opposing counsel to plead their special cases.

"In the matter of pulpwood supplies and consumption policies, also, there has been, instead of direct negotiations between mills and publishers, a situation where the mills have been supplying information to the Government, with the publishers as interested parties on the outside and subject to government rulings, over which the Canadian producers have no direct control.

"Political maneuverings also have been a factor in the matter of policy considerations. There have been misunderstandings in some quarters about the divisions within the paper industry, and different needs and requirements."

De Laval Gets Navy "E" Renewal

The Navy Board for Production Awards has granted a renewal of the Navy "E" Award made in May, 1942 to the De Laval Steam Turbine Company, Trenton, N. J., for excellence in industrial production. The new award is for a period of six months, dating from November 15, 1942, and carries the right to add a White Star to the Navy "E" burgee flown over the plant. The formal presentation of the Navy "E" burgee with the White Star added was made at a ceremony held in the De Laval plant on January 27.

Nashua Earns $9.32

The Nashua Gummed and Coated Paper Company for 1942, reports a consolidated net profit of $429,261, equal to $9.32 a share on 46,058 common shares, against $563,448, or $12.23 in 1941.

WHEN PAPER MAKING WAS AN INDIVIDUAL EFFORT

In 1772 it was a workshop—not a factory—in which paper was made. It was the art of paper making. Now it is an industry—a long way removed from the individual effort of making sheet by sheet. Today machines produce tons easier than the early paper maker produced sheets. Even with individual effort felts were used to remove water from the sheets, and as machines replaced hand methods, felts too kept pace with development of the industry.

Since 1890 Appleton Felts have met all requirements of paper mill production—today preferred by mills everywhere.

This advertisement is a continuation of a series started in 1940 depicting early history of paper making.

APPLETON WOOLEN MILLS, APPLETON, WIS.

Increases Pulpwood Prices

WASHINGTON, D. C., March 17, 1943 — Increases in the maximum prices of pulpwood produced from four minor species — balsam, pine, hemlock and poplar—in Wisconsin, Michigan and Minnesota, as well as on pulpwood, other than Canadian, produced elsewhere and sold in these three states, have been announced by the Office of Price Administration. No change is made in the ceiling prices on spruce, the major species of pulpwood produced in these states.

The new ceilings were decided upon after consultation with industry and after completion of studies conducted by OPA. There are three purposes in the changes.

1. They will restore normal price differentials as between the different species of wood, and between rough and peeled wood, that were established by trade custom over a period of years.

2. They will preserve the customary competitive relationship between production of the several pulpwoods.

3. They will encourage a balance in the production of the various species of pulpwood.

The new ceilings, and comparison with those prevailing previously, follow, per cord:

	Rough		Peeled or rossed	
	New	Old	New	Old
Spruce wood....	$14.00	$14.00	$17.00	$17.00
Balsam wood....	12.00	11.00	14.00	14.00
Jack-pine wood..	9.50	8.00	12.00	12.00
Hemlock wood..	9.00	9.00	11.50	11.00
Poplar wood....	8.00	6.50	{11.50 [1] {10.00	{10.50 [2] {9.00

[1] 55-inch length.
[2] 100-inch length.

The old ceilings, it developed, tended to encourage production of certain pulpwood types to the detriment of mills adjusted to a specific kind of pulpwood as raw material.

Amendment No. 1 to Maximum Price Regulation No. 257, which embodies the revisions, effective March 18, 1943, also clarifies the provision dealing with pricing points:

The amendment explicitly sets forth the maximum prices for pulpwood loaded on railway cars, loaded on vessel, in the lake or stream in which the wood is to be driven to the mill, and delivered mill at the sellers' expense. Provision for a maximum price, f.o.b. loading point when no vehicle is available, has been eliminated. A method of determining maximum prices on a roadside basis has, however, been incorporated into the regulation. In this case, the loading and transportation charges from the roadside to the actual loading point must be deducted from the maximum price.

"When my ship comes in"

is a very old saying in New England. There, many a young adventurer made tidy sums in spite of hazardous ocean risks.

Their ship's timbers were sawed by hand from curved tree trunks and limbs of sturdy oak, to sail the seven seas.

Today New England's shipyards are booming again, but with the clang of steel upon steel. Although we have gone modern in materials and technique, we still put the good old New England conscience into our work.

The traditional evidence of fine workmanship still characterizes **DRAPER FELTS** — try one soon!

Draper Felts Favor Efficiency

DRAPER BROTHERS COMPANY

Woolen Manufacturers Since 1856

CANTON, MASS.

OUR REPRESENTATIVES *to serve you*

L. H. BREYFOGLE, Kalamazoo, Mich.
C. K. BEECHER, Delaware, Ohio
W. L. CAMPBELL, Savannah, Ga.
E. R. LELOFF, Vancouver, Wash.
RALPH E. BRIGGS, Canton, Mass.

PAPER TRADE JOURNAL

Title Reg. U. S. Pat. Off.

Henry J. Berger

EDITOR

Vol. 116 March 18, 1943 No. 11

COMING EVENTS IN PAPER INDUSTRY

New England Section. Technical Association of the Pulp and Paper Industry—Third Friday of each month at the Roger Smith Hotel, Holyoke, Mass.

Delaware Valley Section. Technical Association of the Pulp and Paper Industry—First Friday of each month at the Engineers Club, Philadelphia, Pa.

Lake States Section. Technical Association of the Pulp and Paper Industry—Second Tuesday of each month at the Conway Hotel, Appleton, Wis.

Kalamazoo Valley Section. Technical Association of the Pulp and Paper Industry—First Thursday of each month at the Park, American Hotel, Kalamazoo, Mich.

American Pulp and Paper Mill Superintendents Association, Twenty-fourth Annual Convention, Commodore Hotel, New York, June 15-17.

FREEDOM FROM WANT

It has been asserted by many socialistic-minded persons that the United States must play a cooperative part in the rehabilitation of the post-war world. The general pattern for this objective is a combination of military strength, economic aid and the social betterment of mankind everywhere. The broad principles which form the foundation for this future world is of Utopian-like substance and are included within the Atlantic Charter. They are being reiterated by advocates of the New Deal. Social reform is so closely intermingled with win the war plans that each of the several objectives must be separately considered in any attempt to evaluate their merits and to comprehend the impact upon the familiar world of yesterday—before the United States entered the war.

Take the Atlantic Charter, for an example and its declaration assuring freedom from want to everybody, everywhere. In a short but clear analysis of this subject, Harley L. Lutz, professor of public finance at Princeton University, in *The Tax Review*, published by Tax Foundation, 30 Rockefeller Plaza, New York, states in part: "The so-called Atlantic Charter, drafted by President Roosevelt and Prime Minister Churchill, proclaimed as a post-war goal certain freedoms for all men. One of these freedoms was referred to in the annual budget message. The basis of this generalization was in the preceding sentence of the message, reading as follows: 'The tremendous productive capacity of our country, of all countries, has been demonstrated.' It is true that the total production of this and of other countries has been enormously increased in response to the war need. War production goes on with no regard to cost and the vast bulk of that product is poured into the insatiable gullet of the war god. It is being paid for in civilian deprivation and by large and continuous inflation of credit and currency. In the economic sense such a procedure is unsound and unwholesome. It cannot serve as a long-run method of providing any kind of security of freedom from want."

In commenting on the fact that in the Atlantic Charter freedom is not limited, Professor Lutz states: "The impossibility of ever producing enough to satisfy completely all wants of men is one of the unchangeable characteristics of the world as it exists. It is obvious that any speculative interpretation that points toward a condition in which all men shall no longer experience unsatisfied wants or needs is a foolish waste of time. Needless to say, such a situation, could it be realized, would be deadly for it would eliminate a very large part of the motivation which impels men to seek both prosperity and happiness. Fortunately, there is no danger whatever that this stage will ever be reached."

In referring to that aspect of the freedom from want dictum which holds forth a promise of equality, the writer states in part that, "The fatal weakness of the doctrine of equalitarianism is its impairment of motivation and the fatal weakness of the ideal of universal freedom from want is its disregard of motivation as sine qua non to realization of the ideal. . . . Consequently, the question of how those who are to be made free of want are to pay for their freedom becomes of paramount importance. The only way in which they can pay is by performing some kind of service in the production of the goods they are to receive. The workers in this country can do this by getting jobs and earning the price of the goods they want to buy. The workers in other countries can do this by producing the kind of commodity or service that their resources and their productive capacity permit. But even after doing this, the only way they can share in the abundance of other countries, our own for example, is by trading their products for ours. There is no other way for them to acquire more goods, or goods which they do not produce. There is no other way to a sound development of a foreign market."

In considering the procedure of handling the situation by either private or public subsidy, the former being used extensively in the 1920's, Professor Lutz points out that, "Unless the foreign loans are so carefully selected and limited as to assure amortization by the debtors, the procedure of lending money abroad to finance exports is an excellent method of giving goods away, or of working for the other fellow for nothing. . . . These considerations would not deter government. Furthermore, the pump priming experiments of the 1930's were based on an economic philosophy which is exactly in line with the idea of subsidizing the good life for everybody,

everywhere. Moreover, there is a conviction in certain quarters that a renewal of pump priming is inevitable in the post-war period.

In conclusion Professor Lutz states: "The record is presumptive evidence that the translation of productive capacity into freedom from want will be attempted via the pump priming public deficit. The post-war national debt will be so large that no possibility of final redemption need be considered. The people will be in the situation of the creditor who has advanced so much that the safety of his entire loan depends upon keeping the debtor afloat by further advances. The post-war debt can be carried, we are told, only by keeping national income at a level high enough that the taxes for interest will not be too burdensome. A high level of national income is to be achieved by further additions to the debt. Thus the process of freeing everybody, everywhere, from want is very likely to be undertaken by piling up more debt and making believe that the enlarged production stimulated by the pump priming is a natural, real and enduring prosperity."

Paper Box Orders Higher

CHICAGO, Ill., March 15, 1943—New orders for folding paper boxes increased 28 per cent in February in comparison with January, the Folding Paper Box Association of America reported last week. Compared with the like month last year, orders for February showed an increase of 35 per cent. Orders for the first two months of the year were 18 per cent higher than the comparable 1942 period.

Production Ratio Report*

(Production as per cent of six-day capacity)

COMPARATIVE WEEKLY SUMMARIES

Current Weeks—1943		Corresponding Weeks—1942	
January 30	87.3	January 31	104.3
February 6	87.2	February 7	103.7
February 13	88.6	February 14	103.4
February 20	88.3	February 21	103.8
February 27	90.9	February 28	104.5
March 6	*89.5*	March 7	102.7

COMPARATIVE MONTHLY SUMMARIES

Year	Jan.	Feb.	Mar.	Apr.	May	June	July
1942	104.5	103.9	102.9	100.4	95.3	87.4	75.8
1943	87.5	*88.5*	....	....	....	....	....

Year	Aug.	Sept.	Oct.	Nov.	Dec.	Year Avg.
1942	80.8	82.8	90.6	86.9	80.1	90.4
1943	....	....	....	....	....	....

COMPARATIVE YEARLY SUMMARIES

	1936	1937	1938	1939	1940	1941	1942	1943
Year to Date..	76.5	89.2	66.1	78.5	87.1	87.8	104.0	*88.1*
Year Average.	80.4	79.8	71.5	83.4	85.6	97.4	90.4	...

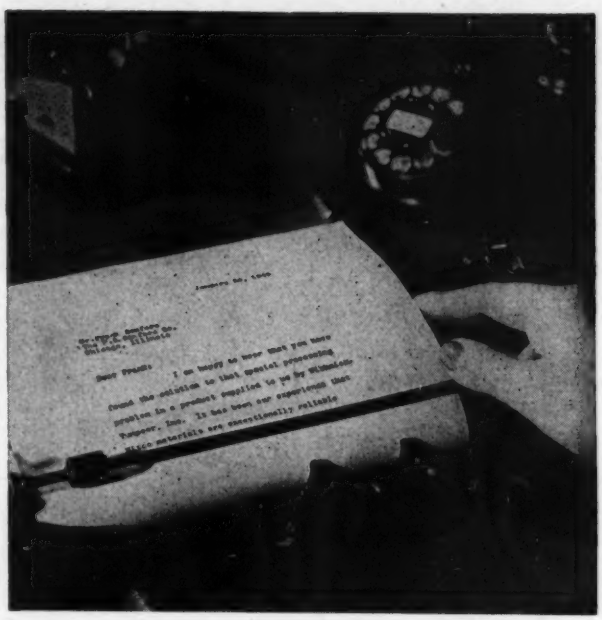
*Based on tonnage reported to American Paper and Pulp Association. Does not include mills reporting to National Paperboard Association, except in isolated cases where both paper and paperboard are produced and separate tonnage figures are not readily available. Does not include mills producing newsprint exclusively.

PAPERBOARD OPERATING RATIOS†

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year Avg.
1937	83	89	89	91	88	80	69	77	72	70	57	47	75
1938	56	63	63	60	60	59	59	60	70	73	67	61	64
1939	65	73	76	74	69	73	68	77	82	91	88	77	77
1940	78	75	74	76	82	85	77	79	78	85	82	77	78
1941	81	88	89	89	91	94	92	98	95	99	98	90	92
1942	102	101	101	95	82	72	68	75	76	81	82	77	84
1943	86	*88*	..	..	..	..	..	..	..	..	..	..	..

Week ending Jan. 30, 1943—88 Week ending Feb. 20, 1943—91
Week ending Feb. 6, 1943—89 Week ending Feb. 27, 1943—94
Week ending Feb. 13, 1943—87 Week ending Mar. 6, 1943—93

†Per cents of operation based on "Inch-Hours" reported to the National Paperboard Assn.



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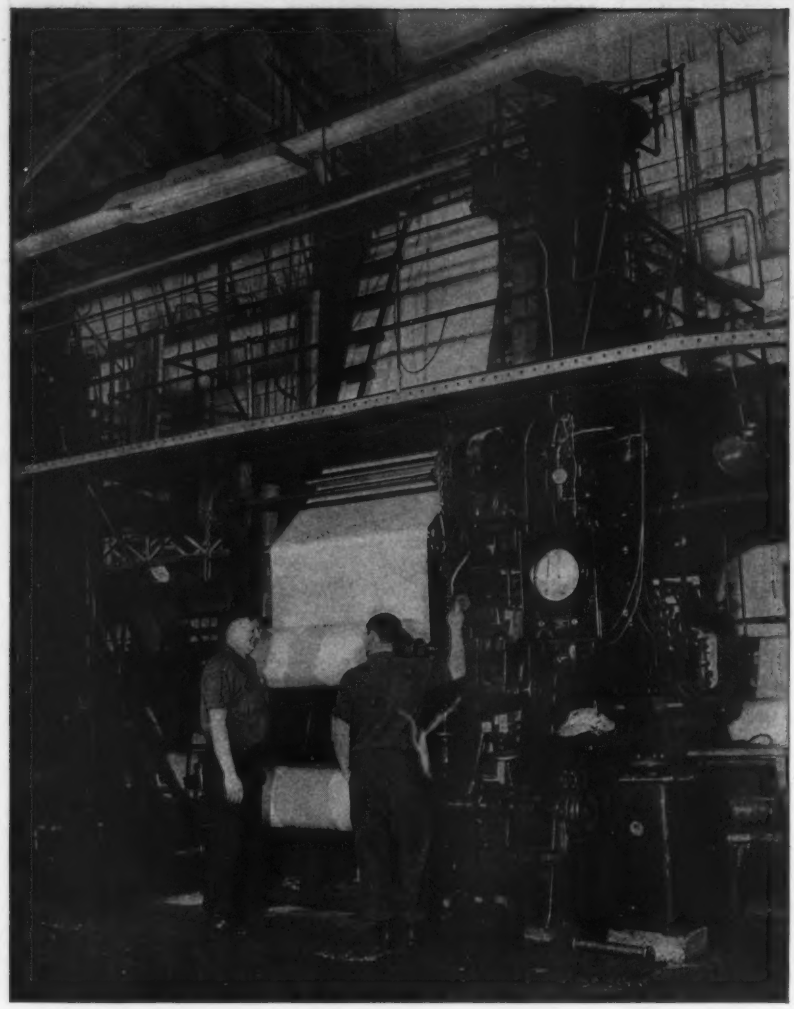

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Edited by R. G. Macdonald, Secretary

Chemical Testing Methods Literature Review*

By B. L. Browning[1]

This review covers the field of chemical analysis of wood, pulp, and paper since the previous annual review *(1)*, and includes papers which are of interest to the Chemical Methods Committee of the Technical Association of the Pulp and Paper Industry.

A previous paper of Cohen and Mackney dealing with preparation of wood samples for analysis has been presented in condensed form *(2)*. TAPPI methods covering preparation of wood samples for analysis *(3)* and the preparation of extractive-free wood *(4)* have been published.

Bloom, Jahn, and Wise *(5)* have continued the study of the monoethanolamine method for the determination of cellulose, and have applied the method to aspen and Sitka spruce woods. According to their recommended method the wood sawdust is reduced to 60-80 mesh, digested with monoethanolamine for 2 hours at 168-170° C., and then given successive chlorine water and sodium sulphite treatments (two for hardwoods and three for softwoods). The determination of cellulose in wood has also been studied by Staudinger and Husemann *(6)*. The chlorine dioxide method of Schmidt was applied for the removal of lignin in order to preserve the cellulose during analysis. The cellulose was isolated from the product without degradation by extracting the noncellulosic carbohydrates with sodium hydroxide in a nitrogen atmosphere. An improved hypochlorite method for cellulose has been presented *(7)*. The reaction between aniline and lignosulphonic acid has been applied to follow the progress of a sulphite cook *(8)*. Kettering and Conrad *(9)* described a rapid semimicro method for determining cellulose in raw cotton, but the method is inapplicable to lignified materials.

An improved apparatus for the determination of methoxyl groups has been designed by Bailey *(10)*. An internal heater for the water condenser and a modified absorption system are described. Samsel and McHard *(11)* have made a careful study of the determination of alkoxyl groups, especially as applied to cellulose ethers. A new apparatus was designed for the application of the Viebŏck modification of the Zeisel procedure, and the effects of a number of factors in the analysis were investigated. The gravimetric barbituric acid method for precipitating furfural in the analysis of pentoses has again been recommended *(12)*.

The very considerable recent interest in the measurement of viscosity of cellulose solutions has been continued during the past year. Straus and Levy *(13)* have developed a rapid method for disperse viscosity of cellulose, based on solution of the cellulose in aqueous ethylenediamine saturated with cupric hydroxide. The solvent and its cellulose solutions were found to be relatively stable and easily reproducible results were obtained. Hatch *(14)* made a further study of the cupriethylenediamine method. A detailed procedure was presented, and an extensive study of a number of factors involved in the viscosity measurement was made. The values obtained were compared with those obtained by use of the American Chemical Society Method.

A modified cuprammonium method was described by Hatch, Hammond, and McNair *(15)*. These authors designed a viscometer tube which can be used for both capillary and falling sphere measurements, and carried out comparative tests by the TAPPI and A.C.S. methods. Mease *(16)* used mixing vials for preparing cuprammonium solutions of cellulose, and poured the solutions into calibrated viscometers for flow measurements. A translation of a paper by Scheller, which appeared in 1935, has been prepared *(17)*. This paper deals with the influence of elementary and active oxygen on the viscosity of cuprammonium solutions of cellulose.

Dimethyldibenzylammonium hydroxide (Triton F) and sodium hydroxide solutions with carbon disulphide were tested for their suitability as solvents for cellulose for fluidity measurements, but were found to possess no advantage over cuprammonium as a solvent *(18)*. Russel and Hood *(19)* compared viscosities of 0.5% cellulose solutions in Triton F and in cuprammonium, and found that a linear relation exists over a considerable viscosity range. The authors concluded that the Triton F test measures both apparent and latent degradation, whereas the cuprammonium test measures only apparent degradation.

Other papers on viscosity include a review of cuprammonium viscosity as a control test *(20)*, the application of the viscosity test as a control in preparation of rag halfstock *(21)*, and a general discussion of cuprammonium viscosity measurements *(22)*.

* Presented at the Annual Meeting of the Technical Association of the Pulp and Paper Industry, Hotel Commodore, New York, N. Y., Feb. 15-18, 1943.

[1] Member TAPPI; Chairman, TAPPI Chemical Methods Committee; The Institute of Paper Chemistry, Appleton, Wis.

Smith *(23)* described a quick method for obtaining a sample for the permanganate number test. Use of a pad mold and a wringer with set pressure was described; the sample was dried on a hot plate without pressure. Other features of the method were studied. Pascoe, Nelson and Fraser *(24)* investigated the relation of pulp bleachability to strength characteristics and behavior in beating.

Rue presented a summary of responses to a TAPPI questionnaire regarding pulp bleaching and control methods *(25)*. It was concluded that a reliable oxidation test for soluble organic matter is still needed. Ostrowski *(26)* applied the Prelinger method for determining the oxygen number of filtrates in pulp washing studies.

Further work on the calcium acetate and titration methods for determination of the carboxyl content of cellulose and oxycellulose has been reported by Heymann and Rabinov *(27)*. Weber *(28)* has determined carboxyl groups by application of a basic dye (Methlylene blue). An excess of the dye was added and the uncombined dye removed by washing. The bound dye was recovered by acid treatment and measured colorimetrically.

The work of Kenyon and his associates *(29, 30)* on the oxidation of cellulose by nitrogen dioxide has added considerably to our knowledge of the nature of oxidized celluloses. The relationships of reducing groups, acidic groups, furfural yield, alkali solubility and viscosity were established for prepared oxycelluloses which were of the uronic acid type. Procedures for the determination of carboxyl groups by the calcium acetate and carbon dioxide-evolution methods were compared. Purves and coworkers *(31)* developed a method for the estimation of the dialdehyde type of oxidation, such as that obtained by the action of periodic acid on starch or cellulose. This should prove another valuable test applicable in the examination of oxidized celluloses.

The chemical analysis of paper has received little attention during the past year. Leach *(32)* described routine methods for determining arsenic, lead, and copper in printed papers. A short alkaline extraction method was applied to the estimation of rosin in paper *(33)*. The rosin was separated by acidification of the extract and removed by filtration, after which it was dissolved in alcohol and titrated with standard alkali. Wax was determined by weighing. Dijk *(34)* determined starch in paper by extraction with dilute acetic acid and subsequent hydrolysis to glucose; mannan was determined by solution in aqueous chloral hydrate from which, after concentration, the mannan was precipitated by addition of alcohol.

TAPPI Tentative Standard T 435 m (hydrogen ion concentration of paper extracts) has been revised *(35)*. Procedures for both hot and cold water extractions have been included in the method.

Finally, the writer finds it impossible to omit mention of two very excellent review papers which have appeared during the year. One deals with "Instrumental methods of chemical analysis" *(36)*, and the other is "A review of organic microchemistry" *(37)*.

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Fibrous Raw Materials Testing Committee Report 1942*

By B. E. Lauer[1]

The committee for Fibrous Raw Materials Testing of the Technical Association of the Pulp and Paper Industry which has for its function the study of improved methods and the standardization of existing procedures for the testing of fibrous raw materials has continued its work, although at a much retarded pace, during 1942. The projects, in committee, active at the present time are those dealing with the physical evaluation of pulpwood, the screen analysis and the dirt content of chips, improvements in the method of determining holocellulose in wood,

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and a new method of cellulose determination using the hydroxylamines as agents for the solution of lignin.

Literature Survey

The determination of the chemical composition of various species of wood has continued to hold the attention of several persons. Both the cellulosic and noncellulosic constituents of red beechwood have been determined by Storch and Müller *(1)*. Chen and Cameron *(2)* have estimated the cellulose content of the various parts of the cotton plant and of several species of wood native to the southeastern United States. The analysis of Siamese hardwoods has been reported by Sitkata and coworkers *(3)*. The determination of ash, solubilities in various solvents, and the content of pentosans, lignin, cellulose, cellosan, and holocellulose has been made on a series of American hardwoods by Freeman and Peterson *(4)*. The chemical composition of pine and birchwood has been determined and reported by Sharkov and Muromtseva *(5)*.

Considerable effort has, as usual, been directed toward devising means for simplifying the method for the determination of cellulose. Vladeso *(6)* reports satisfactory results from the standpoint of reproducibility by the use of nitric acid as a solvent for the noncellulosic constituents. The yields of cellulose residue thus obtained are somewhat low, however, when compared to the results obtained by the use of the more or less standard method for cellulose determination. Improvements on the Jenkins method for cellulose determination have been suggested by Honda *(7)* who indicates that the revised method is distinctly superior to the original, which in turn is itself an improvement over the method of Cross and Bevan.

Jahn and coworkers *(8)* have continued the investigation of the use of monoethanolamine in the determination of cellulose. While they have obtained satisfactory results in the method they are using, only a part of the chlorine, water, and sulphite treatments can be replaced by the monoethanolamine extractions. Fisher *(9)* has reported the results obtained in a study of the solvent action of ethanolamine on cornstalk lignin. This reagent gives considerable promise and the methods already described using it as a solvent have materially reduced the effort required to determine the cellulose content of vegetable fibers.

The use of ethylacteto acetate with a hydrochloric acid catalyst as a solvent for lignin has been thoroughly studied by Virasano *(10)*. This solvent also is of considerable interest as a means for improving the speed and accuracy of the cellulose determination.

Schenck and Kurth *(11)* in determining the holocellulose of wheat straw have found that the method used for the estimation of the percentage holocellulose in wood when applied to straw gives yields which, depending on the temperature used in the procedure, gives yields from 2.5% to 17% too low.

Hemicelluloses of cornstalks have been prepared and studied by Weihe and Phillips *(12)*.

Much experimental work has been reported in the last eighteen months dealing with the accurate determination of cellulose fluidity in various solvents. Improvements in the standard method for dissolving cellulose in cuprammonium solution have been described by Mease *(13)*. Hatch and coworkers *(14)* have made a comparison of the capillary flow and falling sphere methods of determining the viscosity of cuprammonium solutions of cellulose and have determined that conversion between the two methods is possible. The use of cuprammonium viscosity as a control has been reviewed by Toovey *(15)* who cites 82 references in connection with this method.

The viscosity of solutions of cotton in dimethyl dibenzyl ammonium hydroxide have been studied by Russell and Hood *(16)*. Factors for the conversion of viscosities in this solvent as compared to those obtained by the solution of cellulose in the ordinary cuprammonium have been discussed by the authors. Straus and Levy *(17)* describe a method for viscosity determination of cellulose using cuprithylene diamine as a solvent. They report that viscosities of cellulose in this solvent are much higher than when corresponding weights are dissolved in cuprammonium. They have also investigated the use of the same solvent as a means for cellulose fractionation *(18)*.

Of a more theoretical nature, but still of interest from the standpoint of fibrous materials testing, is the work of Eisenhut *(19, 20)* on the characterization of cellulose of different origin by their behavior in various concentrations of caustic. Weber *(21)* has described an improved means for estimating the CO_2H content of the cellulose molecule by methylene blue absorption. In that the actual absorbed methylene blue is released and quantitatively measured, he has called the procedure "a reversible methylene blue method." Kruger has written an article *(22)* covering a general study of the absorption of methylene blue by cellulose.

Various reagents which will produce characteristic colors with lignin have been described by Cartesi *(23)*. He reports that the treatment of plant sections by sulfanilimide in aqueous caustic solutions followed by hydrochloric or nitric acid will develop a yellow color due to the lignin content. He also reports that sulfapyridine, sulfathiazole and other organic compounds having free p-NH_2 groups give a similar reaction.

The relationship of various properties of wood and the quality of pulp has received some attention. Anderson *(24)* has studied the effect of decayed wood on the quality of kraft and sulphite pulps.

An attempt to classify wood species on the basis of measurements of pulp fibers and on wood cross sections has been made by Mühlsteth *(25)*. He has shown that differentiation between four major classes of wood is possible by means of fiber measurement.

A more theoretical approach to the measurement of fiber properties is the work by Seborg and Simmonds *(26)* on the measurement of stiffness of single fibers.

Reports covering general fiber structure and its relationship to the reactions of wood have been made by Klinkstedt *(27)*.

Cohen and Mackney *(28)* have published another in a series of papers on the effect of sample preparation on wood analysis.

Chip size, both from the standpoint of its determination and of its effect on pulp properties has been the subject of several papers published during the past months. Dickinson and Lauer *(29)* have described several of the features of importance in the screen analysis of chips. Williams *(30)* has also made some comments concerning this analysis. The relationship of chip size and pulp quality have received further attention from Hagglund and Bergek and has been the subject of several publications *(31)* by these men.

Rieth *(32)* has described a method for the determination of either wood or chip density concurrently with routine moisture analysis. He recommends that the warm and dry chips left from the moisture determination be immediately dipped in hot paraffin and allowed to drain and cool. The paraffin coated chips are then, it is indicated, in a suitable condition for density determination.

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W. R. Brown Retires as Woods Manager

BERLIN, N. H., March 15, 1943 — A group of Brown company officials and woods department employes and staff tendered W. R. Brown a testimonial dinner recently on his retirement March 1 as woods manager. Speakers paid high tribute to Mr. Brown.

New Books Available

ENGINEERING ECONOMIC ANALYSIS by Clarence E. Bullinger, Professor of Industrial Engineering, Pennsylvania State College, 359 pp. This book has been prepared for young engineers and covers development and promotion costs, construction cost and investment, depreciation and depletion cost, valuation and appraisals, operating costs, economic return, financial analysis and compound interest. It is well illustrated and contains a number of tables. Price $3.50.

EMPIRICAL EQUATIONS AND NOMOGRAPHY by Dale S. Davis, Mathematician, Michigan Alkali Company, 200 pp. Mr. Davis was formerly a member of TAPPI and a number of his papers, including nomographs were published by the Association. His book covers the correlation of engineering test data, combining new techniques with standard methods and presents the essentials of the construction of alignment charts which provide rapid and convenient means for making calculations. Theory, working directions, illustrations and practical problems from recent literature facilitate efficient engineering application. Price $2.50.

MATHEMATICS DICTIONARY by Glenn James and Robert C. James, U.C.L.A., 327 pp. This book covers the vocabulary of mathematics from arithmetic through integral calculus. Illustrated examples are used to clarify the definitions. It is essentially a book for students. Price $3.00.

THE FREEZING PRESERVATION OF FOOD by Donald K. Tressler and Clifford Tressler, formerly of the General Foods Company, 786 pp. This book is reviewed primarily because of the interest of the paper industry in the packaging of foods, particularly during the war. Although but one chapter is devoted to this subject, it is felt that many will be interested in the entire subject of quick freezing in order to obtain a background of the problems involved. Summaries relating to most quick frozen food products are given. Price $8.00.

SUBSTITUTES by H. Bennett, Technical Director, Glyco Products Company, 225 pp. This is a handbook of substitutes and alternatives for chemicals, metals, fibers and other commercial products and includes a plan for making a proper choice. Price $4.00.

ADHESIVES by Felix Brande, 152 pp, was written for the practical man who is interested in adhesives either as a producer, consumer or salesman. It is not intended for the technical specialist. It covers tests, raw materials, starch, casein, glues, sodium silicate, rubber dispersions, gum, rosin, wax and putties and is essentially a formula book. Price $3.00.

CELLULOSE CHEMISTRY by Mark Plunguian, Chemist for the Homosote Company, 96 pp., is written largely for the chemist beginning in the field or working in allied fields. It covers a microstructure of cotton and wood fibers, isolation and purification of cellulose, general properties, dispersion and derivatives, modified cellulose, constitution and micellar structure of cellulose. Price $2.25.

Copies of all these books may be obtained from the Book Department of the Technical Association of the Pulp and Paper Industry, 122 East 42nd street, New York, N. Y.

Report of the Chemical Methods Committee, 1942*

By B. L. Browning[1]

The Chemical Methods Committee of the Technical Association of the Pulp and Paper Industry was organized late in 1941, and the year 1942 represented the first full year of its existence. The committee is composed of ten members and, to facilitate consideration of specific methods, has been supplemented by the organization of two subcommittees, one dealing with the analysis of wood and pulp, the other with the analysis of paper. Each subcommittee has eight members.

A symposium on "Chemical Methods of Testing" was held during the annual meeting on February 16-19, 1942. The session was conducted under the chairmanship of James d'A. Clark, and the discussions were led by Clark and E. D. Rich. The subject of viscosity measurements received considerable attention, and an interesting discussion ensued following presentation of papers on this subject. The following papers were presented:

"Monoethanolamine extraction of wood for the determination of cellulose," by E. C. Jahn.
"Cupriethylenediamine as a solvent for cellulose fractionation," by F. L. Straus and R. M. Levy.
"Cross sectioning of paper," by John H. Graff and M. A. Schlosser.
"A comparison of the capillary flow and falling sphere methods of determining the viscosity of cellulose in cuprammonium solutions," by R. S. Hatch, R. N. Hammond, and J. J. McNair.

In addition to the papers formally presented, E. D. Rich presented reports on the following subjects:

"A Preliminary report on a correlation between the Rich and TAPPI viscosity test results" and *"Reduction of viscosity from seconds to poises."*

A paper, *"The Influence of Elementary and Active Oxygen on Cellulose on the Basis of Viscosity Measurements,"* by Emil Scheller *(Melliand Textilberichte* 16, No. 11:787-791 (1935)) has been translated from the German by E. A. Weber and E. D. Rich and made available to the Association *(Tech. Assoc. Papers,* 25:551-55 (1942)).

An annual review of chemical testing methods falling within the province of the committee has been prepared by the chairman.

At this time, only one subcommittee has been organized dealing with a single testing method. This is the subcommittee on viscosity measurements, of which Raymond Hatch of the Weyerhaeuser Timber Company is chairman. It is to be hoped and expected that this subcommittee will be able to recommend an improved method for measurement of the disperse viscosity of cellulose and pulp.

The following projects of the committee have been the subjects of detailed consideration, and the resulting revisions or new methods have been forwarded through the chairman of the testing division to the standards committee:

No. 135. Methoxyl Content of Wood and Pulp (T 2 m and T 209 m).
No. 139. Pentosans in Pulp and Wood.
No. 163. Preparation of Samples for Wood, Pulp and Paper.
No. 165. Lignin in Wood and Pulp.
No. 166. Ash in Wood, Pulp and Paper (T 211 m and T 413 m).
No. 167. Preparation of Extractive-free Wood and Pulp.

Methods resulting from projects No. 163 and No. 167 have been published in the PAPER TRADE JOURNAL as TAPPI Tentative Standards T 11 m-42, and T 12 m-42, respectively.

The committee also prepared a method for "Chlorine Consumption of Pulp." A revision of T 214 m ("Permanganate Number of Pulp") was prepared and subsequently approved by the chairman of the Pulp Testing Committee. Revision of T 421 m ("Qualitative Analysis of Mineral Filler and Mineral Coating of Paper") which had been initiated by the Paper Testing Committee was continued by the Chemical Methods Committee.

The following projects not yet completed will be included in the work of the committee for the ensuing year:

No. 164. Copper Number of Paper and Pulp (T 215 m and T 430 m).
No. 171. Alpha-Cellulose in Pulp and Paper (T 203 m and T 429 m).
No. 172. Beta- and Gamma-Cellulose in Pulp and Paper (T 429 m).

In addition, it is anticipated that other projects will be established to receive attention of the committee. Consideration will be given also to methods which require only correction rather than revision to bring them up to date.

TAPPI Notes

The Empire State Section of the Technical Association of the Pulp and Paper Industry will hold two regional meetings in March. George E. Fromm of the American Cyanamid and Chemical Company will be the speaker at both meetings. In addition a motion picture "The Magic of Modern Plastics" will be shown. On March 24th at 7 P. M. the meeting will be at the Woodruff Hotel, Watertown, N. Y., under the chairmanship of W. R. Benson of the National Paper Products Company and on March 25th at 7 P. M. it will be held at the University Club in Syracuse, N. Y., under the chairmanship of W. O. Hisey of the N. Y. State College of Forestry.

The TAPPI Kalamazoo Valley Section will meet at the Columbia Hotel, Kalamazoo, Mich., on April 1st, at 6:30 P. M. F. W. Padgett of Moore & Munger, New York, N. Y., will talk on "The Origin and Compositions of Various Waxes Showing Crystal Structure and Their Application in Commerce."

H. F. McLeRoy, formerly of J. E. Stirrine & Co., is now with the Savannah Machine and Foundry Company, Shipbuilding Div., Savannah, Ga.

Lieut. Harvey P. Cannon, member TAPPI, on leave of absence from the Mutual Boxboard Company, Utica, N. Y., narrowly escaped death this month. Lieuts. Cannon (observer) and Swift (pilot) on Civilian Air Patrol duty near Delaware had to take to rafts when their plane developed engine trouble during a snowstorm. Pilot Swift was found dead probably from exposure on his raft thirty hours after he made the forced landing. Lieut. Cannon's raft was picked up by a Coast Guard vessel. He escaped injury. He stated that the two rafts were forced apart by the high seas.

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Package Problems Confronting Quick-Frozen Food Industry*

By A. B. Brackett[1]

The freezing of food products is no longer a new industry. For a great many years fish has been frozen and held in storage indefinitely. No great thought was given to the packaging of this product. It was glazed with water ice, which formed a protective coating on the fish, and as the fish were later to be handled as a fresh product, the ice glaze was considered sufficient. Meat and poultry were later frozen but no study of packaging of these products was considered necessary. A few fruits, such as strawberries and cherries, were also frozen many years ago, but again real packaging problems were considered unnecessary with these products. They were merely mixed with sugar to produce a syrup and packed in barrels or in tin cans holding 30 pounds.

Products frozen and handled as they were years ago were not considered on a par with the same fresh products and were sold accordingly as inferior products.

Quick Freezing of Perishable Foods

The advent of quick freezing completely changed the frozen-food industry. It was found that the minute ice crystals formed by quick freezing, produced a product that was equally as good in every respect as a fresh product of the same type, and the possibilities for the preservations of perishable food and the distribution of same over long periods of time were recognized. Now fruits and vegetables can be successfully quick frozen and used the year round, instead of only in the various seasons in which they are grown.

When these conditions were realized and successfully proven, real packaging problems confronted the packers of quick frozen food products. The Birds Eye Company was the pioneer in the field of quick-freezing perishable foods and its method of quick freezing was to package the product in a container and freeze it under pressure between refrigerated metal plates. This necessitated a rectangular package and one that was no thicker than absolutely necessary to produce a commercial package and yet one in which the product could be frozen as quickly as possible.

Packaging Problems

A large percentage of the perishable foods are consumed in the homes, therefore one of the first packaging problems was consumer distribution and convenience. Protection of the product, over long periods of low-temperature storage, against dehydration, oxidation, off flavors, and retention of vitamins and other nutritive values was the subject of much laboratory research before a satisfactory package was obtained. Production problems also were deciding factors in the choosing of the final package. The package eventually chosen for consumer distribution had standard dimensions of 5 inches by 4 inches for the length and width, and a varying thickness from 1-3/16 to 1⅝ inches to accommodate various products. The net contents of these packages varied from 10 ounces to 1 pound. This variation was necessary to provide uniform servings from each package.

A rectangular package not only proved most economical during the quick freezing operation but also conserved vital space during transportation, in low temperature storage warehouses, and in distribution of the products.

Cartons

The results of all of the research work indicated that paper and paperboard offered adequate protection and more possibilities than any other material. Cartons made from firm, clean paperboard, treated to prevent discoloration and softening from the moist products, and wet conditions were considered a satisfactory container. A cold-water wax treatment appeared to be efficient, the least costly, and did not have a tendency to impart a detrimental flavor to the product. The carton in itself did not provide adequate protection to the product during storage, therefore a protective liner for the carton was necessary.

Liners

It was found that a liner, to furnish proper protection to the product, must be impervious to water and have a high resistance to the passage of water vapor. Waxed paper liners were the best obtainable in the earlier days of quick freezing but were not as impervious as desired and quick-frozen products could not be satisfactorily kept in storage for long periods of time when in liners of this description.

Regenerated cellulose was in its infancy in the early days of quick freezing, and although comparatively costly it offered more promise than any other material available for a satisfactory carton liner or wrapper for frozen foods. The first regenerated cellulose used was brittle when subjected to low temperatures; the nitrocellulose coating separated from the base sheet when in contact with wet products, had slightly objectionable odors, and was not quite as impervious to the transmission of moisture vapors as desired. With all its apparent disadvantages, it provided a liner, or a wrapper, that solved one of the most critical of the early packaging problems connected with quick-frozen food products. The objectionable qualities of the regenerated film has since been eliminated to such an extent that it provides the best commercial material available today for the preservation of quick-frozen foods.

The liner problem for adequately protecting quick-frozen foods presents a challenge to the paper industry. At the present time, the regenerated cellulose film provides the best commercial material available for this purpose but it is not beyond the realm of possibility for the paper industry to produce a thin, strong, wet-strength sheet of paper that can be coated

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* Presented at the Annual Meeting of the Technical Association of the Pulp & Paper Industry, Hotel Commodore, New York, N. Y., Feb. 15-18, 1943.

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or treated so that it will have the necessary qualities for protecting quick frozen foods. Although transparency is a desirable quality, it is not absolutely necessary now that quick-frozen products have been accepted by the public. The cost factor must be seriously considered in connection with this problem. A material for this purpose should have a water vapor transmission rate of not over 0.4 grams per 100 square inches at 100° F. and 95% R. H. or 0.02 grams at 0° F.

Thin transparent rubber-base films were tested when they were first available commercially, but were not considered satisfactory because they were brittle at low temperatures and had a very objectionable odor. These objectionable features have since been eliminated and films of this type have been developed that are superior to any other film for protecting quick-frozen foods during low-temperature storage, but unfortunately, these films are restricted for the duration of the war.

The following results of a test conducted with regenerated cellulose and transparent rubber-base films is very interesting, and indicates why the rubber base films provide slightly better protection to quick-frozen foods during long periods of low-temperature storage than the other type. The product used for this test was chopped steak molded into units 5 by 3 by ¾ inches and each unit was individually wrapped. Twelve wrapped units were packed into a two-piece telescopic carton made from a cold-water waxed board and the cartons were quick frozen. One half of the frozen individually wrapped units of chopped steak were removed from the cartons and placed on shelves in a 0° F. storage room, while the remaining half of the units were left in the cartons and stored in the same room.

The water vapor transmission rate of the regenerated cellulose films by the GFMVT method averaged 0.39 grams loss per 100 sq. in. at 100° F. and 95% R. H., and the rubber-base films averaged 0.67 grams loss per 100 sq. in. However, the water vapor losses at 0° F. for the regenerated cellulose film averaged 0.02 grams per 100 sq. in. while the loss for the rubberbase film at the same temperature was only 0.005 grams per 100 sq. in. The results of these tests indicate that determinations for the transmission of moisture vapors at the higher temperatures are only relative and are not an exact indication of the protective values at low temperatures.

The test with the chopped steak was a practical example of the foregoing statement, and also proved that the waxed carton provides a certain amount of protection against moisture loss during low-temperature storage.

Weighings were made of the individually wrapped units of chopped steak monthly and at the end of 292 days in storage, the units wrapped in regenerated cellulose lost 5.1 grams each on the open shelf and 1.4 grams in the cartons, while those wrapped in the rubber-base film lost 0.8 grams on the open shelf, and there appeared to be no loss from those stored in the cartons. What little loss there was could not be measured.

Wrapper

A carton overwrap of waxed paper was considered necessary to provide a sanitary and tamperproof package and to provide added protection to the product. It was found that ordinary paraffine waxes would not stay heat-sealed satisfactorily at low temperatures and that it was necessary to add other ingredients to the paraffine wax to obtain a satisfactorily heat-sealed wrapper.

Packages made from paperboard cartons having flexible type of protective liners and waxed paper overwraps could be compressed slightly between refrigerated plates without injuring or detrimentally distorting the packages. This compression feature is necessary to provide good contact between the plates and both surfaces of the product.

Shipping Case

In the early days of the quick-frozen food industry, low-temperature transportation and storage warehouses were not efficient nor plentiful. This condition made it necessary for the quick frozen food packers to provide excessive insulation to their shipping cases so that the product would arrive at its destination in proper condition. A special double-wall corrugated shipping case with two double-wall liners and several pads both in the top and bottom of the case were first used. This condition has changed tremendously and today the equipment and methods of handling quick-frozen products have become so efficient that a regular single-wall corrugated shipping case without pads or liners is perfectly satisfactory.

Tests have indicated that kraft corrugated shipping cases having a water-finished outer liner stands up better under the condensed moisture condition that exists during transportation of quick-frozen foods than any other type. However, jute cases are being used by some packers and might be more commonly used if the outer liners were treated so that they would not become effected by condensed moisture.

Syrup Packs

Several of the quick-frozen fruits are packed in a syrup which necessitates a rectangular leakproof container. A container of this type offers real packaging problems. Many special types of containers were developed and tested but all had weak points. Several types of glued bags were tried but all leaked. One of the most important requirements for a material used in a bag of this type is, that it should have a good wet strength and be elastic enough to withstand the expansion of the product during the quick-freezing operation. Eventually a nitrocellulose coated paper was produced that could be heat-sealed and a leakproof bag was first manufactured. At that time, there were no heat-seal bagmaking, nor bag-closing equipment available and all of the early bags of this type were made by hand. Machines for making and closing bags of this type have since been developed and are used extensively today.

The nitrocellulose coated paper was only fairly satisfactory in its early stages. Glassine coated with a nitrocellulose coating was first used in a small way but was much too brittle for this purpose. Nitrocellulose lacquer was next tried on parchment but it was difficult and too costly to apply enough of the lacquer film to this sheet to seal well and to provide proper protection to the product.

A heat-sealing regenerated cellulose film was developed at about this time and this material with an anchored coating provided a material that could be used satisfactorily.

A thermoplastic coating consisting of a rubber and wax combination was successfully developed and tried on vegetable parchment paper but the bond between the coating material and the parchment paper was not satisfactory under the wet conditions nor at the low temperatures that existed. Many types of paper were

developed and tested before a satisfactory one was obtained. The most satisfactory sheet was made from a special long-fiber alpha pulp and given a chemical treatment to provide the necessary wet strength and then plasticized to provide the necessary stretchability to withstand the pressure due to freezing expansion. The nature of the surface of this sheet is such that an excellent bond with the coating material was obtained. This thermoplastic coated sheet was used successfully under the adverse conditions that exist until rubber was restricted by the war. The base sheet of paper that proved most satisfactory for making bags for this purpose had a wet bursting strength of approximately 27% of the dry bursting strength. It also had an elongation of 3.5%.

Since then many coatings made from materials that are not restricted have been developed and tested and practically all have proven unsatisfactory for packaging quick-frozen fruits. Many of them could not be bonded satisfactorily to the paper and others were not sufficiently impervious to the transmission of moisture vapors. There is still a very good opportunity for the paper industry to develop a paper and a coating to produce satisfactory bags for quick-frozen fruit products. The specifications for a sheet of this type are, that it shall have a water vapor transmission rate of not over 1 gram per 100 sq. in. at 100° F. and 95% R. H. or 0.05 grams at 0° F. It shall also heat-seal tightly and stay sealed under wet conditions and at 0° F.; must be plastic enough not to rupture or the coating separate from the paper due to the expansion of the product during freezing, must be free from noticeable odors, must not block at 100° F. and run freely on a bagmaking machine. The paper must have a good coating surface and a sufficient wet strength to stand up satisfactorily under wet conditions.

Other Methods of Quick Freezing

Since the pioneer days of quick-freezing, several different methods of quick freezing perishable food products have been developed and are being used commercially today. The original method of quick freezing the product in the package under pressure between two refrigerated metal plates produced a solidly frozen product. A carton having a sheet liner completely enveloping the product provided adequate protection to the product. The fact that the product was moist and frozen under pressure practically sealed the liner around the product so that the product did not desiccate even though the liner was not mechanically sealed. A large portion of the more than 400,000,000 pounds of quick-frozen products that will be used this year will be packed in this manner during 1943.

However some of the new methods of quick freezing produce a loose-frozen product. That is, one that is quick-frozen before packaging and then packaged after freezing. The packaging problems for a loose-frozen product are somewhat different than for the solidly frozen product but basically they are the same. A top-opening, sheet-lined carton as mentioned previously as being satisfactory for a solidly frozen product would not be entirely satisfactory for a loose-frozen product. Even though the liner completely surrounded the loose-frozen product, it could not be sealed tightly around the product due to the uneven surface and lack of moisture and pressure. Practically all of the loose-frozen products are packed in a bag made from regenerated cellulose and the bag is placed in an end-opening carton. A fairly large percentage of the 1943 packs of quick-frozen food products will be packaged in this manner. The loose freezing of products is limited to those products that will flow easily and which can be packaged advantageously after freezing. Products such as spinach, broccoli, asparagus, squash, and other similar products cannot be satisfactorily quick-frozen and packaged afterwards.

Institutional Packages

So far I have only mentioned consumer distribution but quick-frozen perishable foods are used extensively in institutions such as hotels, restaurants, hospitals, trains, boats, and even by the Army and Navy. The packaging problems in connection with the institutional packs were similar to those for the consumer size. After the sizes were determined it was a comparatively simple problem to change the consumer style package so that it would fit into the institutional picture very readily. Most of the institutional packages have a net weight of either 2½ pounds or 5 pounds.

A relatively small percentage of the loose-frozen products are packed in a so-called bulk package which contains approximately 30 pounds or 50 pounds of product. The usual container for this type pack is a corrugated shipping case containing a duplex bag consisting of a laminated glassine inner bag with a kraft outer bag. This container is fairly satisfactory but the paper industry could do much to improve it. Inner bags made from regular laminated glassine have been used commercially by several packers of loose-frozen products, but this type of glassine is more or less affected by moist conditions which make it somewhat undesirable. A wet-strength type of glassine has been developed which has practically overcome this undesirable condition.

Cry-O-Vac bags provided one of the most protective materials available for the keeping of quick-frozen products, especially the larger units such as poultry, until it was restricted by the war. The water vapor transmission rate of this material was very low at 0° F. and its elastic quality coupled with the possibility of its being subjected to a partial vacuum made it an excellent packaging material for quick-frozen foods. However, it had certain limitations of use particularly in connection with consumer packages. The thinness of this material when applied to a product made it necessary to protect the cry-o-vac film by the use of other materials to prevent the rupturing of the rubber film after the product was quick-frozen.

Future Packages

The packages that are being used today for the packaging of quick-frozen products are fairly satisfactory and do keep the product in an acceptable condition even after relatively long periods of storage at low temperatures. However, I do not believe that the best package has ever been produced. I visualize a single-unit container, made from materials that may not even exist at the present time. This container could be used for most solid frozen and all loose-frozen products and would be manufactured, filled, and closed at the point of production. It will require entirely new mechanical equipment and undoubtedly new packaging materials. I believe that some day in the future that the packaging industry, both mechanical and paper, will produce such a container and the frozen food industry is waiting for such a package and hope it can be developed in the not too distant future.

Undoubtedly a rectangular package will always be used by the quick-frozen food industry and the ideal or ultimate package might well be transparent and should be made from materials not affected by water or juices or temperatures as low as —30° F. It should be flexible enough to withstand pressure without detrimental distortion; should be closed tightly to prevent leaking or desiccation of the product, and the materials used should be practically impervious to the transmission of moisture vapors. It should be relatively easy to manufacture and be readily handled automatically during production and the ultimate cost should be comparatively low.

You may be interested in the following figures. It is estimated that the quick-frozen food industry will consume approximately the following tonnage of paper and paperboard during the year 1943:

Paperboard	16,200 tons
Corrugated Paper	7,500 tons
Waxed Paper	1,800 tons
Cellophane	1,700 tons

The Flat Crush Test*

By Pierre Drewsen[1]

Apparatus

The proposal has been made to incorporate a flat crush test requirement in Rule 41 of the Consolidated Freight Classification. There is no present official flat crush test method nor any other standard method of testing corrugated paper for stiffness.

Some of the variables which occur in the laboratory determination of flat crush test are described and the individual variation caused by each is determined by a series of tests in which all factors are unchanged except the variable under study. The tests indicated that the greatest variation in flat crush test depends on whether the corrugations fail by vertical compression or by rolling over sideways. The magnitude of this variation, as determined, appears to be around 35%. The next greatest source of possible variation is that caused by the presence of moisture in the samples. The difference in results between those from samples conditioned at about 30% R. H. and those conditioned at 65% R. H. is on the order of about 25%. A little difference in results was obtained by doubling the area of samples, and only a slight difference by halving the downward speed of the pressure platen. Some results were also obtained on an instrument made by adapting an inexpensive scale for rolling failure tests. It was found that the difference in results between this and previous tests was slight, but because insufficient samples were tested no attempt was made to draw a conclusion.

The results of "first end point" and "final end point" were somewhat erratic, whereas the results of "rolling failure" were much more uniform and seemed to average within 5% of "first end point" results.

The truss structure of doubleface board is discussed. It is pointed out that of two doubleface boards of equal final end point, the one with higher first end point is probably the better for the reason that it preserves its truss structure under higher intermittent pressure, and therefore offers a higher resistance to bending. While it is not concluded that the rolling failure end point should be adopted as the flat crush test index number of corrugated paper quality, it is nevertheless suggested that further collaborative study be made of these methods by the industry in order to arrive at standard stiffness testing methods for corrugated products.

A recent proposal to incorporate a flat crush test in Rule 41 of the Consolidated Freight Classification as a measure of the quality of the corrugated medium has stimulated much thought and discussion about the merits of this test. This paper is offered as a progress report which gives some of the available facts and a discussion of some of the variables resulting from method variations.

The Hinde & Dauch Tester

One method of measuring flat crush test is the Hinde and Dauch Paper Company tester which is described in complete detail in the *Paper Trade Journal* of March 10, 1938. *Flat crush test* may be defined as the measured minimum load per unit of area which, when applied perpendicularly to the surface of single or double face board, causes the corrugated arch to fail. However obtained, or in whatever units expressed it is an index number which measures the stiffness of the medium which keeps the outer and inner liners of a box in their original relative position.

No official method or test specification for flat crush test exists in the paper board industry. A number of testing laboratories employ it, but if two of them have adopted the same procedure it was probably accidental. It is therefore somewhat confusing at times when industry men discuss the subject. The inclusion of a flat crush test in Rule 41 would necessitate the adoption of an official test method. Before this can be done properly, the variables which affect the test, as performed in the laboratory, as well as those attributable to paper making and combining factors should be thoroughly understood. It is the author's hope that this slight contribution will help to direct thought along this channel.

Among the probable laboratory variables are the following: whether the corrugations fail *regularly* by vertical compression or side roll; the moisture content of the samples at the time they are tested; the rate at which the crushing load is applied; the size of the sample selected for test; the kind of machine used for testing.

We selected four different types of commercial doubleface corrugating material known to possess differing degrees of stiffness in their corrugated element. These were stored for over 48 hours prior to testing in the laboratory where humidity conditions were relatively low, averaging about 30% relative. Care was taken to see that each set of samples was tested under identical conditions. With one ex-

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ception The Hinde & Dauch tester was used, and the samples used were circles of 5 or 10 square inches in area. Ten samples were used to obtain averages except as indicated or where certain intermediate end points were unobtainable.

The first sets of tests were performed particularly to evaluate the difference between vertical failure and rolling failure. It was found from experience that vertical failure is obtained at all times provided the circular samples are A flute and no larger than five square inches. The difference between vertical and rolling failure is indicated in Fig. 1. In order to produce rolling failure we placed a rigid metal plate on top of the corrugated sample (see Fig. 2) and then laid two rollers on top of that, so that the upper platen of the tester in its downward movement would contact the rollers, and these in turn the metal plates, which exert pressure on the sample. As soon as the breaking point is reached in this pressure system the corrugations fail by rolling over sideways.

In obtaining "vertical" failure several "end points" are often encountered. These are intervals in the downward movement of the upper platen during which the pressure recording dial stops, indicating that the two liner surfaces are moving closer together because a change is taking place in the shape of the corrugated arches. After one of these intermediate end points the corrugations look more like rectangles than a sine curve. Table I gives the result of this series of tests. This and other series are shown graphically in Fig. 3.

TABLE I

5 sq. in. circles, platen speed 2 inches per minute. Samples conditioned at about 30% R.H. Results in p.s.i.

Sample	A	B	C	D
First end point.....	13.1	13.3	15.2	24.3
Final end point.....	16.0	20.7	23.7	32.8
Rolling failure	13.1	9.5	17.5	19.1

After making a number of these tests we learned that the first and subsequent intermediate "end points" are often absent. Instead of a definite interval of yielding where the load indicator dial stops, it sometimes merely slows down, but not enough for the observer to take a definite reading. For this reason figures on first end point are sometimes unreliable, hence there is a possibility that the second end point may be mistaken for the first.

The second series of tests was made to find out what difference might be caused by using a sample twice as large. (Table II.)

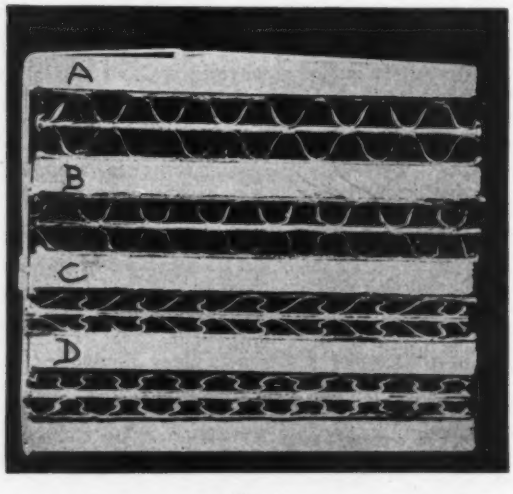


FIG. 1

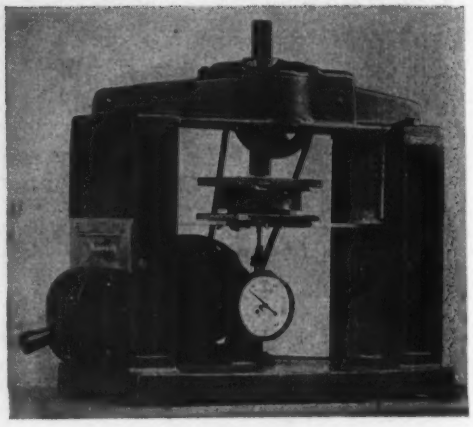


FIG. 2

TABLE II

10 sq. in. circles, platen speed 2 inches per minute. Samples conditioned at about 30% R.H. Results in p.s.i.

Sample	A	B	C	D
First end point.....	14.6	13.6	17.7	18.0
Final end point.....	17.0	21.3	22.3	28.6
Rolling failure	14.0	9.7	17.7	20.2

A comparison of the corresponding figures of Tables I and II indicates that there are individual differences, but, if we compare the sums of all the results in the Tables we find that of Table I to be 218.3 and that of Table II to be 214.7. It is therefore probable that the difference in flat crush test result obtained between samples 5 sq. in. in area and those 10 sq. in. in area is probably not much greater than 1.5% and may indeed be negligible.

The third series of tests was made to determine the difference caused by a platen speed of one inch per minute as against two inches per minute. It has been found by experience that two inches per minute is a good working speed in that it enables the operator to make and record his readings without difficulty and to remove and replace samples at this tempo without inactive intervals; whereas half this speed seems rather slow and would appear to be impractical from the standpoint of time consumption. On the other hand it is doubtful if a speed much higher than 2 inches per minute would be practical either, as time would probably be wasted in sample placement, and end point observations might also be obscured.

The results of "half speed" operations are given below:

TABLE III

5 sq. in. circles; platen speed 1 inch per minute. Samples conditioned at about 30% R.H. Results in p.s.i.

Sample	A	B	C	D
First end point.....	13.6	11.5	17.6	19.9
Final end point.....	15.7	20.9	24.0	30.3
Rolling failure	12.9	9.3	17.0	18.9

Comparing this with Table I, where all factors except platen speed are the same we find, on taking the sum of all the results, that it is 211.6. Comparing this with 218.3 the sum of the results in Table I, we may tentatively conclude that slowing the platen speed to this extent gives a slightly lower result, on the order of 4.5% less.

The next series was designed to estimate the effect of moisture variations. One set, results given in Table IV, were run on oven dried samples, and another, results given in Table V, on samples conditioned at 65% R.H. for 48 hours.

TABLE IV

5 sq. in. circles, platen speed 2 inches per minute. Samples moisture-freed. Results in p.s.i.

Sample	A	B	C	D
First end point.....	12.1	11.3	16.5	17.2
Second end point.....	15.0	18.3	21.4	22.6
Final end point.....	16.3	21.3	24.5	25.7
Rolling failure	13.0	9.1	16.9	18.2

The total of all the above results, (those of second end point omitted), is 202.1 which indicates a difference from that of Table I on the order of about 7.5%. In this case there was a distinct intermediate end point. Very dry samples often give three such break downs, whereas with increasing moisture content the interemediate end points tend to disappear.

Tables IV and V indicate that flat crush tests tend to be a maximum where there is a small amount of moisture in the samples. With no moisture, or with a moisture content corresponding to 65% R. H. (12.0% to 12.8%) the flat crush test tends to be less.

TABLE V

5 sq. in. samples; platen speed 2 inches per minute. Samples conditioned at 65% R.H. for 48 hours. Results in p.s.i.

Sample	A	B	C	D
First end point.....	9.9	9.5	11.9	17.5
Final end point.....	11.8	15.1	17.2	23.2
Rolling failure	11.0	7.0	14.6	14.6

In Table V, the average of results on "rolling failure" represents an average of only two, instead of ten samples. The sum of these results is 163.3 indicating a difference from Table I of around 25%.

We estimated the difference between the results of "rolling failure" and first and final end points, by tabulating the sums of comparable individual results in Tables I to V, as follows:

TABLE VI

	Table Nos.	I	II	III	IV	V	Grand Totals
X	Sum of first end points	63.9	62.6	57.1	48.8	65.9	298.3
Y	Sum of final end points	89.2	90.9	87.8	67.3	93.2	428.4
Z	Sum of rolling failures	61.6	58.1	57.2	47.2	59.2	283.3
	Ratio Z/X	0.965	0.929	1.002	0.967	0.900	0.949
	Ratio Z/Y	0.691	0.640	0.651	0.702	0.635	0.661

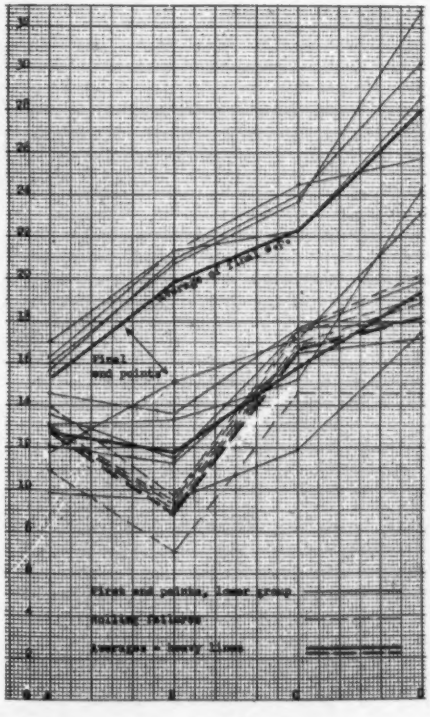


FIG. 3

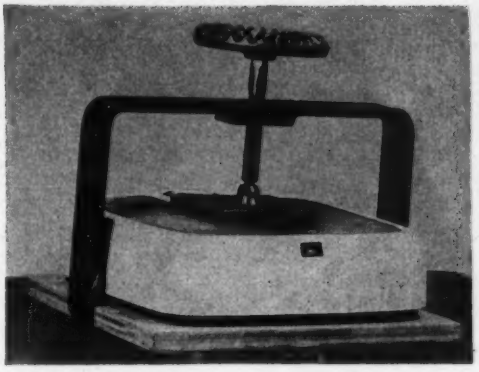


FIG. 4

Table VI indicates a possible relationship between rolling failure and first end point since the sums of results are in every case fairly close. Also, the ratio of rolling failure to final end point appears to be a fairly steady one. We may then, tentatively estimate that the ratio of the results of "pure rolling failure" to "final end point" is on the order of about 66%, while the ratio of "pure rolling failure" to "first end point" is about 95%. We use the expression "pure rolling failure" because our general experience indicates that final end points are often a resultant of "pure vertical compression failure" and "pure rolling failure," in other words, a quantity in between. For this reason, some doubt may be cast on the reliability of "vertical failure" end points. In our work using a flat metal plate and rollers we endeavored to make failure by side roll as frictionless as possible.

In order to show these results graphically we refer the reader to Fig. 3. Rolling failure values are connected by dotted lines; the others, by full lines. With the exception of Table V values, the results fall into three distinct groups. Of these, the rolling failure group is easily the most consistent, and maintains its parallelism most uniformly. The other two, first and final end point groups are more erratic. The full lines show the averages of the three groups of five points each.

The consistency of rolling failure results is of special interest for two reasons. The first of these is the tendency of most testers we have examined, especially those of homemade construction, to produce this type of failure without any possibility of obtaining vertical failure. For example, a testing device for flat crush can be made by building a frame with a pressure applying device around an inexpensive bathroom scale as indicated in Fig. 4. With this type of apparatus, in which the scale platform "floats" freely, corrugations are free to roll sideways without appreciable end thrust resistance. We give in Table VII a comparable series of results obtained on this instrument.

TABLE VII

Bathroom scale; load applied by turning wheel by hand. All failures rolling; results in p.s.i.

Sample	A	B	C	D
Bathroom scale	10.5	9.2	16.4	18.1
Average of Tables I-V...	12.8	8.9	16.7	18.2

With the exception of the A group, the similarity of results is good, and this indicates that perhaps some of these less expensive devices may possess

greater merit than they have been credited with up to the present.

A second reason why rolling failure is of interest is its apparent relation to the truss structure of corrugated board. According to its definition, a truss is a rigid framework of members which can not be deformed by exterior force without distortion of one or more of its components. The truss structure of a doubleface board fails by compression even when the board itself "checks" as it "bends."

Now, of two trusses of equal materials, but of different depths, or distance apart of their horizontal members, the one with the greater distance apart is the stronger as regards its ability to resist "bending." Therefore, of two doubleface boards of equal final end point, it is believed that the one with the higher first end point is the better in that the distance between its liners remains intact for a longer period of time as load increases.

We have tried to show this, and its relation to the foregoing tests, by making a stress-strain diagram during a flat crush test, on each of the boards tested. We were able to do this by operating the Hinde and Dauch tester intermittently by hand, after connecting a deflection gage to the upper as well as the lower platen (see Fig. 5), and then taking simultaneous readings of the two gages at about 0.05 or 0.01 inch deflection. The reading of the gage under the bar gives the load, whereas the difference between the two gage readings gives the magnitude of the deflection, or strain. The obvious disadvantage of this method is its intermittent operation and extremely slow speed, which, without doubt, gives crush test values different from those obtainable under normal speed. Nevertheless in the absence of a better method, the development of which the time at our disposal did not permit, we decided to publish this data since they seem to throw light on the behavior of the samples in previous tests, and since they show how the various end points develop, or are obscured, under vertical (but not under rolling) compression.

Referring to Fig. 6 first end points occur where the first maximums appear, as at 16.3 on Sample C, at 14.0 pounds on Sample D, and 12.6 pounds on Sample A. On Sample B there is no maximum. The extremely slow platen speed in this case produced a gradual yielding, instead of a more sharply pronounced yield point, which might have occurred had pressure been applied more rapidly.

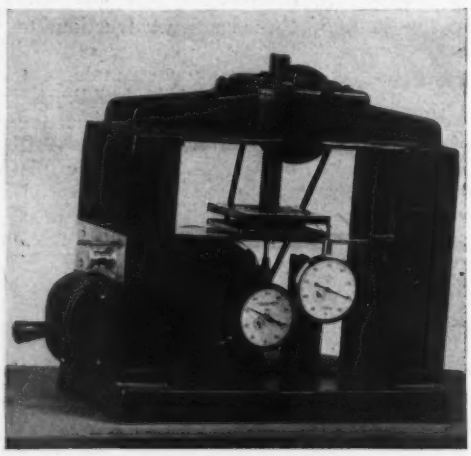


FIG. 5

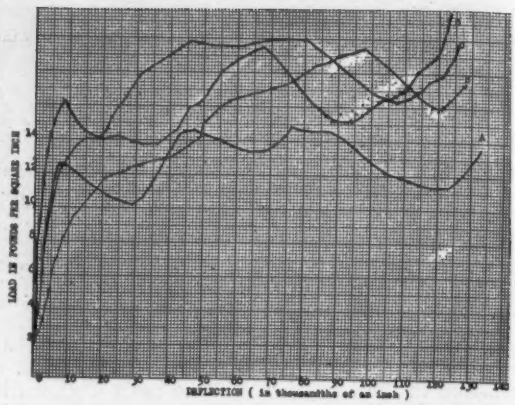


FIG. 6
Stress-Strain Diagram

Samples A and C check fairly closely on first end points with corresponding values in Table I, but Sample D does not. In the tests made at normal speed we believe it possible that the first end point in Sample D was obscured, and that what we read was the "second" end point. In other words, instead of stopping so that its reading could be observed, the indicator dial merely slowed down.

Figure 1 shows the manner in which the various types of fracture take place. In vertical failure two fractures are indicated in each corrugated element, Fig. 1-D. In rolling failure there are two breaks in every other element. Figure 1-B shows clearly that in first end point there is a double break in every other member indicating that a preliminary side shift has taken place in the direction of a rolling failure. If the construction of the tester is such that no very great side slip can take place, then the final end point will be a vertical one, like Fig. 1-D.

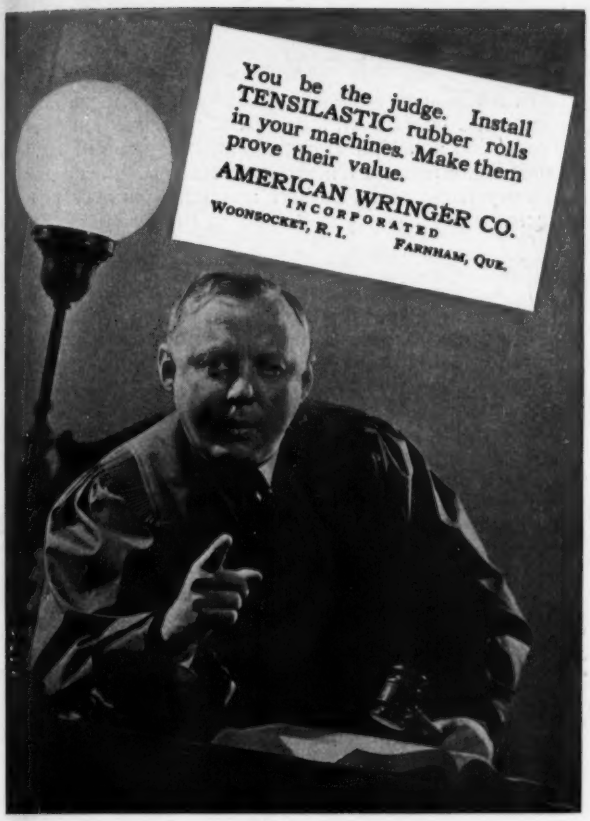
Due to the lack of any means of obtaining stress-strain diagrams on flat crush tests it is difficult to be certain that "first end point" is not confused with some other intermediate yield point. For this reason and because there is only one end point in rolling failure, which coincides fairly closely with first end point, perhaps the former could be used instead of the latter, especially since its more consistent groupings are so easy to obtain with any known type of compression tester.

From the above we do not conclude that rolling failure should be taken as an index number of the structural stiffness of the corrugated arch,—we merely ask "Should it?" and we urge that this question be answered by further cooperative work in the industry.

Similarly we suggest that none of the quantities or tentative conclusions offered in this paper be taken categorically, but rather that any acceptable features of the methods suggested be used as guides to a more extended investigation, with the view of developing in the near future acceptable standardized methods of testing container material for stiffness.

Additional Information

Pierre Drewsen, "The Hinde and Dauch Paper Company Crush Tester," *Paper Trade J.* (March 10, 1938); *Tech. Assoc. Papers* 21: 162-164 (1938).
Pierre Drewsen, "Status of Stiffness Testing of Containers," *Tech. Assoc. Papers* 24: 398-399 (1941).
Pierre Drewsen, "Paperboard Defects and Some Remedies," *Paper Trade J.* (March 26, 1942); *Tech. Assoc. Papers* 25: 269-271 (1942).
Pierre Drewsen, "The Nutcracker", *Fiber Containers* p. 40 (Jan. 1943).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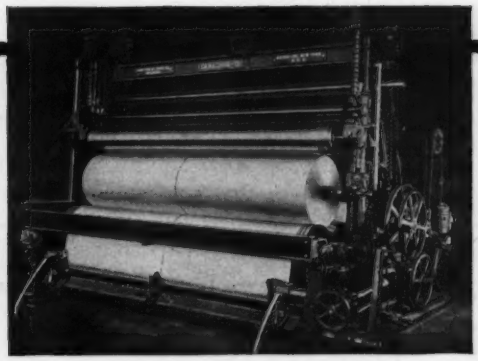

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SPOT WEAR IN FOURDRINIER WIRES

This photomicrograph shows what happens to those small dents caused by stock lumps, rust, slime or other objects passing between the wire and the takeup or return rolls. Because these dents are "out of plane" they receive the most abuse and soon wear through. This results in a hole like that shown above.

Take every precaution to prevent these dents and add to the life of your wires.

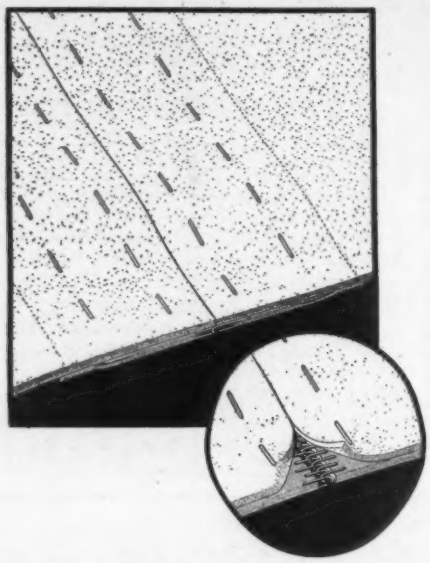
This is the second of a series on factors contributing to wire life.

Appleton Wire Works, Inc. Appleton, Wis.

Drier Felt Seams

A new booklet recently issued by the Asten-Hill Manufacturing Company, Scott's Lane (East Falls), Philadelphia, Pa., explains how any type of seam can be used with Asten drier felts. The publication points out that every mill has its own "best" type of seam and its own method of putting in the seam, based on individual mill conditions, which accounts for the various types of drier felt seams in use.

The booklet clearly illustrates with large engravings, details of making many forms of drier felt



A Typical Illustration from the New Booklet, Representing the Hill Clipper Seam.

seams, such as the outside and inside bootleg seams, the herringbone, flat sewed, plain and three-and-one riveted seams, the double three riveted type, the reinforced riveted seam, lap glued and butt glued seams.

The joining methods of the Hill clipper seam and the Asten clipper seam are illustrated and described. A diagram clearly shows how the installation of Asten endless drier felts are made on any standard paper machine.

The booklet states that, while there is no good reason why a mill should change its type of drier felt seam, if the one in use is satisfactory, changes in the paper machine sometimes make it necessary to change the type of drier felt seam. The booklet is, therefore, of particular interest to mill men who are seeking information on a new "best" type of seam that will furnish the most satisfactory service for drier felts.

Seek Deferment for Loggers

Efforts to obtain deferment from the armed services for key men in the timber industry of British Columbia, with the suggestion that experienced loggers now in service be released wherever possible to relieve the manpower crisis in the west coast woods, are being continued in negotiations with the Federal Government.

MAY SOLVE LABOR SHORTAGE

(Continued from page 7)

In addition to establishing his business in the new location, Mr. Hill will be actively engaged in war production as technical consultant to a group of west coast manufacturers making marine machinery for Liberty ships, and to others making machinery products.

Granted Patent on Photometer

J. A. Van den Akker, research associate of the Institute of Paper Chemistry, Appleton, Wis., has been granted a patent on his invention of a photometer. He has assigned the patent rights to the institute.

The invention enables light beams to pass alternately through a spectral sample and a uniform sector opening in alignment therewith, and then through the spectral standard and the graduated sector opening in alignment therewith. Uses include the measuring of spectral qualities of materials and substances.

Menasha Workers to Donate Blood

More than 400 employees of the Menasha Products division of the Marathon Paper Mills Company, Menasha, Wis., have volunteered to donate a pint of blood for the plasma supply of the Red Cross when a mobile unit arrives in the city this week. The arrangements were made through the cooperation of Mrs. Eileen Briske, mill nurse.

R. F. Bellack Appointed by N. M. A.

R. F. Bellack, executive vice-president of the Fox River Paper Corporation, Appleton, Wis., has been appointed a member of the recently created Transition Period Subcommittee of the National Manufacturers Association. The committee met at the Drake Hotel, Chicago, March 6, to begin an intensive study of industry's number one postwar problem, that of providing jobs for those who will leave war industries and the armed forces. The committee is composed of key industrialists of the country.

Annual Safety Meeting Postponed

Because of war conditions and rationing, the annual meeting of the Fox River Valley and Lake Shore Safety Conference, planned for Appleton, Wis., this spring, has been postponed until after the war, according to a decision reached by the steering committee. W. E. Schubert, chairman of the committee, announced that the conference will be invited to Appleton when its sessions resume. The gathering has been held for many years, attracting 3,000 mill executives, foremen, safety workers and public officials.

M. E. McGarry Made District Sales Mgr.

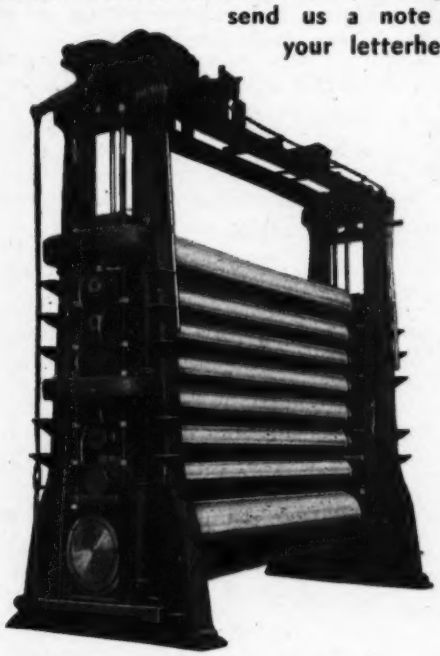
Eastern Corporation, Bangor, Maine, announces the appointment of Michael E. McGarry as district sales manager, Chicago office.

Mr. McGarry is well known to mid-west paper merchants, having served as mill representative for several paper mills for a number of years.

Mr. McGarry, who now lives in Chicago, will continue to make his home and headquarters there, and will handle Eastco customers in that area out of the company's Chicago office.

"10 YEARS ahead of their time" in construction features and performance-values . . . That's the observation of many who have investigated the Lobdell Calender Stack.

Engineers point out the floor-controlled lifting devices, the point-by-point lubrication, the super-finished rolls. *Production executives* are impressed by the efficiency Lobdell Stacks lend to calendering—the uniform quality of output—and the long life of the Stacks and very little maintenance. You will be interested in its future possibilities; for detailed information just send us a note on your letterhead!



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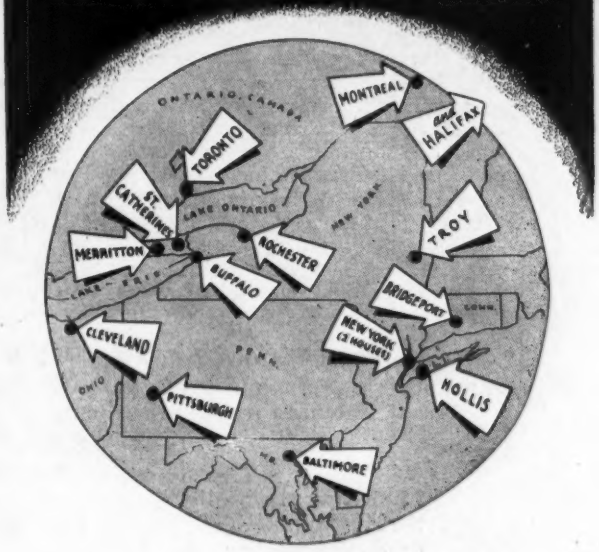

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New York Paper and Pulp Market Review

OPA Issues Amendment to Price Regulation on Pulpwood and Shipments of Pulp From East to West—New Prices Set on Cotton Cuttings are 10% Below Last March—Paper Stock Market Strong.

Office of the PAPER TRADE JOURNAL,
Wednesday, March 17, 1943.

All important grades of paper are in active demand. Reports received this week from most of the manufacturers' representatives, jobbers, and general paper merchants, reflect concern over the complexities of transacting business, due to rising costs, manpower and transportation problems.

The index of general business activity for the week ended March 6 declined to 135.5, from 140.9 for the previous week, compared with 132.3 for the corresponding week last year. The index of paper board production stood at 147.9, compared with 147.7 for the previous week, and with 165.1 for the coresponding week last year.

Paper production for the week ended March 6 was estimated at 89.5%, compared with 102.7% for 1942, with 91.0% for 1941, with 83.4% for 1940, and with 84.3% for the corresponding week for 1939.

Paper board production for the week ended March 6 was 93.0%, compared with 101.0% for 1942, with 80.0% for 1941, with 69.0% for 1940, and with 70.0% for the corresponding week for 1939.

In commenting on the newsprint situation, the *Bulletin* of the American Newspaper Publishers Association, issued last week, stated in part that, "An exhaustive and independent investigation by the A.N.P.A. agrees with the findings of Washington and Ottawa that Canada is able to meet newsprint requirements in the months ahead. . . . Probably the most revealing fact disclosed is that, as a result of a better than expected wood cut in Canada this season, no shortage of pulpwood for newsprint exists in Canada. . . . Price factors are also importantly involved in any step that would further curtail the Canadian newsprint production. Because of the high capital investment in newsprint mills, there have been estimates that another 10% reduction in newsprint production would add $2 to $3 a ton to the cost of manufacturing. This in turn would bring pressure to add to the $4 a ton increase which went into effect March 1." On March 4, the WPB announced that no further cut in print paper consumed by newspapers, magazine and book publishers or commercial printers, will be made until after July 1, 1943. The WPB stated that the United States and Canada would watch the situation and hold another interview in the latter part of April.

Pulpwood

The OPA amendment to Maximum Price Regulation 257, involving pulpwood, states that maximum prices shall not exceed the following f.o.b. the mill yard, railroad cars or on board a vessel: Spruce, rough, $14; peeled or rossed, $17. Balsam, rough, $12; pelled or rossed, $14. Jack-pine, rough, $9.50; peeled or rossed, $12. Hemlock, rough, $9; peeled or rossed, $11.50. Poplar, rough, $8; peeled or rossed, 147 cu. ft., 55 in. lengths, $11.50; and $10 for 133 cu. ft. in lengths of 100 inches.

Wood Pulp

The chemical wood pulp market is reported tight on all bleached grades. Prices are very firm. The lately issued equalization of prices on pulp by OPA, provides the eastern shippers may charge the same maximum prices allowed on eastern delivery, on pulp to West Coast mills, when pulp is unobtainable in the West.

Rags

The OPA issued on March 13, Maximum Price Regulation No. 344, effective March 19, 1943, on 91 grades of new cotton, linen and underwear rags used by paper and fiber mills. The level is approximately 10% below March, 1942, price quotations.

Old Rope and Bagging

No important change has been reported in old rope this week. Mill buying is steady at the ceiling price of $115 a ton on No. 1 Manila rope. Other grades are active.

The bagging market is strong, with prices firm under an active mill demand.

Old Waste Paper

Mill buying of old waste paper is reported as relatively heavy. All grades are reported at ceiling prices, excepting books and magazines.

Twine

Demand for twine continues heavy. Notices have been issued the trade by some manufacturers stating that orders now booked will absorb output for several weeks, and that no further orders can be accepted until a fair share of twine is available to all their customers.

Miss Glazier Heads Sheppard Envelope Co

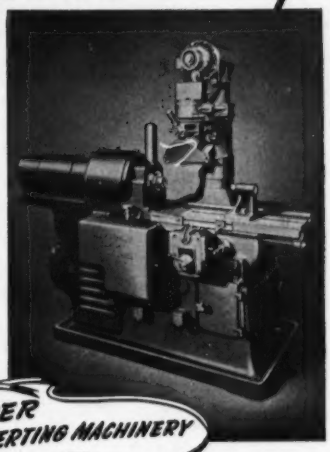
WORCESTER, Mass., March 8, 1943—Miss N. Myra Glazier, assistant treasurer of the Sheppard Envelope Company, since it was established in 1921, was elected president and general manager of the company at the annual meeting of stockholders and directors yesterday. Miss Glazier succeeds the late J. Warren Sheppard.

Others elected were: Harold E. Brewer, vice-president; Linwood M. Erskine, secretary; William H. Sheppard, treasurer. The four principal officers, together with Fred W. Bascom of Worcester, Walter A. Netch of Chicago, and Eugene A. Cahill of New York, comprise the board of directors.

Miss Glazier has been in the envelope industry for about 29 years, beginning with the Sherman Envelope Company in 1913. In 1921, she and the late Mr. Sheppard, who had been production manager of the Sherman company for 26 years, formed the Sheppard Envelope Company. Her home is at 14 Hillcroft avenue.

Mr. Cahill, a new director, has also been with the Sheppard company since 1921 and has been in charge of its New York office during that time.

NOW MACHINE TOOLS Afterwards



Automatic Hob sharpening machine built to design and specifications of Barber - Colman Company, Rockford, Illinois.

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Until then all of our plant facilities are being used to make equipment needed by our fighting forces. Barking drums, screens, chip crushers, pulpwood chippers, wood cleaners—all paper mill and wood room equipment—withdraw from our production lines except where permission to make such equipment is granted by W.P.B. Necessities of war take their places. You'll agree with us that's the all-important job now. But, when all-out efforts triumph we shall be better able to meet your needs for new machinery and parts.

D. J. MURRAY MFG. CO.
WAUSAU, WISCONSIN

MISCELLANEOUS MARKETS

Office of the PAPER TRADE JOURNAL.
Wednesday, March 17, 1943.

BLANC FIXE—Prices on blanc fixe are firm and unchanged and conform to prevailing market levels. The pulp is currently quoted at $40 per ton, in barrels, at works; the powder is currently quoted at $60 per ton, f.o.b., works. Demand reported good for the week.

BLEACHING POWDER — Quotations on bleaching powder are firm. Demand reported good for the week. Bleaching powder is currently quoted at $2.50 per 100 pounds, in drums, at works.

CASEIN—Prices on casein are unchanged for the current week. Standard domestic casein, 20-30 mesh, is currently quoted at 19 cents per pound; 80-100 mesh, at 19½ cents per pound. All prices in bags, car lots. Argentina cents per pound. All prices in bags, car lots.

CAUSTIC SODA—Quotations on caustic soda continue unchanged at prevailing market prices. Demand reported moderate. Solid caustic soda is currently quoted at $2.30 per 100 pounds; flake and ground at $2.70 per 100 pounds in drums, car lots, at works.

CHINA CLAY—Prices on china clay are firm and conform to prevailing market levels. Demand reported moderate at this date. Domestic filler clay is currently quoted at from $7.50 to $15 per ton; coating clay from $12 to $22 per ton, at mines. Imported clay is currently offered at from $13 to $25 per long ton, ship side.

CHLORINE—Quotations on chlorine are firm and unchanged. Market strong. Government demand is reported heavy during the current week. Chlorine is currently quoted at $1.75 per 100 pounds, in single-unit tank cars, f.o.b., works.

ROSIN—The rosin market is reported firm for the week with higher prices on some grades. "G" gum rosin is currently quoted at $3.57 per 100 pounds, in barrels. Savannah "F" wood rosin is currently quoted at $3.56 per 100 pounds, in barrels, New York. Seventy per cent gum rosin size is currently quoted at $3.57 per 100 pounds, f.o.b., works.

SALT CAKE — Prices on salt cake are firm. Demand moderate for the current week. Domestic salt cake is currently quoted at $15 per ton, in bulk; chrome salt cake at $16 per ton. All prices in car lots, f.o.b., shipping point. The quotation of $16 per ton on imported salt cake is nominal.

SODA ASH—Quotations on soda ash are firm and continue to conform to prevailing market levels. Demand reported good for the week. Prices on soda ash in car lots, per 100 pounds, are as follows: in bulk, $.90; in paper bags, $1.05; and in barrels, $1.35.

STARCH — Prices on corn starch are reported unchanged for the current week. Pearl is currently quoted at $3.10 per 100 pounds; powdered starch at $3.20 per 100 pounds. All prices in bags, carlot, f.o.b., Chicago.

SULPHATE OF ALUMINA—Quotations on sulphate of alumina are firm. Demand reported light for the current week. The commercial grades are currently quoted at from $1.15 to $1.25; iron free at from $1.75 to $1.85 per 100 pounds. All quoted prices in bags, carlots, f.o.b., works.

SULPHUR — Prices on sulphur are firm and conform to prevailing market levels. Annual contracts are currently quoted at $16 per long ton, f.o.b., mines. Spot and nearby carlots are quoted at $18 per ton.

TALC — Quotations on talc are firm and continue unchanged at prevailing market prices. Domestic talc is currently quoted at from $15 to $21 per ton, at mines. No quotations on imported talc.

MARKET QUOTATIONS

All market quotations, excepting those otherwise designated as official OPA maximum prices, are based on the manufacturers' price level as of October 1-15, 1941; maximum wholesale prices are based on the merchants' maximum prices for stipulated quantities at a quoted price to all customers of a like class, as shown by the merchant's sales records of goods delivered during March, 1942. A merchant's price list in effect in March 1942, showing quotations of actual shipments, will establish the current maximum prices.

Paper

(Delivered New York)

News, per ton—

Roll, contract	*$54.00	@	—
Sheets	*$62.00	"	—

OPA Maximum Prices.

Kraft—per cwt.—Carload Quantities Zone A, f.o.b. Mill

Superstandard Wrapping	$5.00	@	—
No. 1 Wrapping	4.75	"	—
Standard Wrapping	4.50	"	—
Standard Bag	4.125	"	—

Tissues—Per Ream—Carlots

White No. 1	1.12½	"	—
White No. 1 M. G.	1.05	"	—
White No. 1½	1.00	"	—
White No. 2	1.00	"	—
Anti-Tarnish M. G.	.95	"	—
Colored	—	"	—
Kraft	.95	"	—
Manila	.90	"	—
Unbl. Toilet, 1 M.	4.16	"	—
Bleached Toilet	5.70	"	—

Paper Towels, Per Case—

Unbleached, Jr.	2.35	"	—
Bleached, Jr.	2.65	"	—

Manila—per cwt.—C. l. f. a.

No. 1 Jute	11.25	@	—
No. 1 Manila Wrapping, 35 lb.	5.50	"	5.75
No. 2 Manila Wrapping, 35 lb.	5.25	"	5.50

Boards, per ton—

News	*48.00	@	—
Chip	*45.00	"	—
Sgl. Mla. Ll. Chip	*60.00	"	—
White Pat. Coated	*75.00	"	—
Kraft Liners 50 lb.	*60.00	"	—
Binders Boards	84.00	"	116.00

* OPA Base Prices per 10 tons. Less than 10 tons but over 3 tons, add $2.50; three tons or less, add $5; regular 35-39 basis, add $5.; basis 40-49, add $2.50; basis 91-100, add $2.50; basis 101-120, add $5.

The following are representative of distributors' resale prices:

Rag Content Bonds and Ledgers—White, Assorted Items, Delivered in Zone 1:

100% Rag Ext.	Bonds	Ledgers
No. 1	$39.10@$46.00	$40.25@$47.25
100% Rag	32.20 " 37.75	33.35 " 39.25
85% Rag	.... "	29.90 " 35.00
75% Rag	23.00 " 27.00	24.15 " 28.25
65% Rag	.... "	22.80 " 27.75
50% Rag	18.70 " 22.75	19.90 " 24.25
25% Rag	16.49 " 20.00	17.55 " 21.50

Colors at $1.00 cwt. extra.

Sulphite Bonds and Ledgers—White, Assorted Items. Delivered in Zone 1:

	Bonds	Ledgers
No. 1	$10.55@$12.75	$11.70@$14.25
No. 2	9.65 " 11.75	10.80 " 13.25
No. 3	9.20 " 11.25	10.35 " 12.50
No. 4	8.90 " 10.75	10.05 " 12.25

Colors $1.00 cwt. extra.

Free Sheet Book Papers—White, Cased Paper. Delivered in Zone 1:

No. 1 Glossy Coated	$13.65	@	$15.50
No. 2 Glossy Coated	12.40	"	14.00
No. 3 Glossy Coated	11.60	"	13.25
No. 4 Glossy Coated	11.15	"	12.75
No. 1 Antique (watermarked)	10.25	"	11.75
No. 2 Offset	9.60	"	11.00
A Grade E. F.	9.35	"	10.75
A Grade S. & S. C.	9.60	"	11.00
B Grade E. F.	8.85	"	10.25
B Grade S. & S. C.	9.10	"	10.50
C Grade E. F.	8.55	"	9.75
C Grade S. & S. C.	8.80	"	10.00
D Grade E. F.	8.25	"	9.50
D Grade S. & S. C.	8.50	"	9.75

Ivory & India at $.50 cwt. extra.

Wood Pulp

OPA Maximum Prices and Canadian Manufacturers Prices, Less Freight to Destination.

Bl. Softwood Sulphite	$76.00
Unbl. Softwood Sulphite	65.00@ 66.00
Bl. Hardwood Sulphite	73.50
Unbl. Hardwood Sulphite	63.50
Bl. Mitscherlich	81.00
Unbl. Mitscherlich	72.00
N. Bleached Sulphate	86.00
S. Bleached Sulphate	79.00
N. Semi-Bleached Sulphate	62.00
S. Semi-Bleached Sulphate	75.00
N. Unbl. Sulphate	73.00
S. Unbl. Sulphate	63.50
Bl. Soda	66.00
Unbl. Soda	62.00
Groundwood	46.00

Transportation Allowances Applying to Producers of Wet Wood Pulp.

	Below 50% Air Dry Weight
Northeast	$13.50
Lake Central	13.50
Southern	16.00
West Coast (in area)	10.50
West Coast (out area)	16.50

	50%-80% Air Dry Weight
Northeast	$11.50
Lake Central	11.50
Southern	14.00
West Coast (in area)	9.50
West Coast (out area)	15.50

Applying to Producers of Dry Wood Pulp.

	Above 80% Air Dry Weight
Northeast	$8.50
Lake Central	8.50
Southern	11.00
West Coast (in area)	7.50
West Coast (out area)	13.50

Should freight charges actually exceed these allowances, the difference may be added to the maximum prices.

Domestic Rags

New Rags

(Prices to Mill f. o. b. N. Y.)

Shirt Cuttings—			
New White, No. 1	*7.25	@	—
Silesias No. 1	*5.75	"	—
New Unbleached	*7.50	"	—
Blue Overall	*5.50	"	—
Fancy	*3.50	"	—
Washables	*3.00	"	—
Bleachable Khaki Cuttings	*4.25	"	—
Unbleachable Khaki Cuttings	*3.50	"	—

* OPA Maximum Prices.

ZOPAQUE RG

Pure TiO_2

This grade of TiO_2 shows highest developments of aqueous dispersion and suspension yet attained.

Now available in any quantity without priority, but we will appreciate extension of any priorities available when ordering.

Sole Selling Agents:
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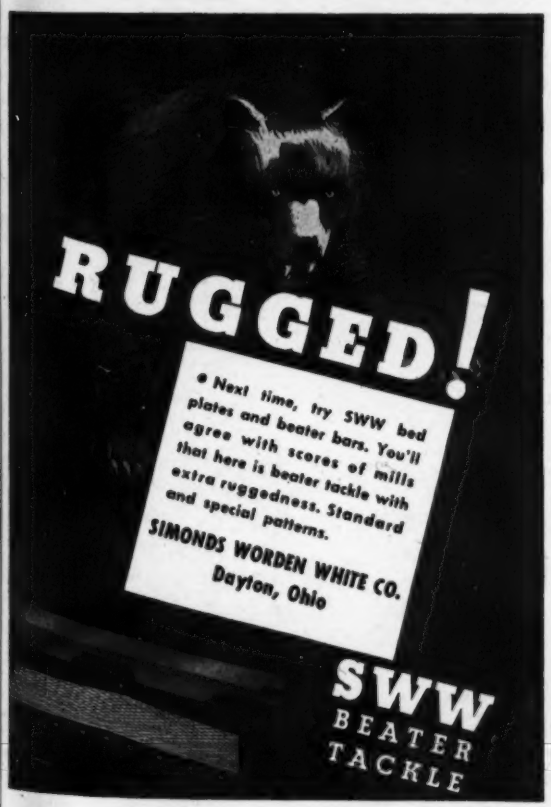
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• Next time, try SWW bed plates and beater bars. You'll agree with scores of mills that here is beater tackle with extra ruggedness. Standard and special patterns.
SIMONDS WORDEN WHITE CO.
Dayton, Ohio
SWW
BEATER
TACKLE

UNITED PIGMENTS

Pure Titanium Dioxide

UNITANE·O

A brilliantly WHITE, pure, fine titanium dioxide possessing excellent . . .

- **OPACITY**
- **BRIGHTNESS**
- **DISPERSION**

Suitable for ALL types of paper ranging from thin printing papers and waxing tissues to coated book and magazine stocks.

UNITANE O—110 was especially developed for paper pigmentation. Its excellent dispersion in water promotes good retention and excellent sheet formation. As a component of the beater furnish, it produces whiter sheets of great brilliance, and superior printing qualities.

SAMPLES of UNITANE O-110 will be sent promptly upon request.

UNITED COLOR AND PIGMENT CO.
DIVISION OF INTERCHEMICAL CORPORATION
NEWARK, NEW JERSEY
SALES OFFICES IN PRINCIPAL CITIES

Old Rags

White, No. 1—			
Repacked	*3.80	"	—
Miscellaneous	*3.20	"	—
White, No. 2—			
Repacked	*2.90	"	—
Miscellaneous	*2.65	"	—
Third and Blues—			
Repacked	*2.20	"	—
Miscellaneous	*1.80	"	—
Roofing Rags—			
No. 1	*1.55	"	—
No. 2	*1.45	"	—
No. 3 (bagging)	*1.35	"	—
No. 4	*1.35	"	—
No. 5A	*1.35	"	—
Old Manila Rope	5.75	"	—

OPA Maximum Prices.

Foreign Rags

All Prices nominal

New Rags

New Dark Cuttings	2.25	@	2.40
New Mixed Cuttings	2.00	"	2.20
New Light Silesias	5.50	"	5.75
Light Flannelettes	5.50	"	5.75
New White Cuttings	7.00	"	7.50
New Light Oxfords	4.00	"	4.50
New Light Prints	3.00	"	3.25

Old Rags

No. 1 White Linens	7.50	"	8.50
No. 2 White Linens	6.50	"	7.50
No. 3 White Linens	4.50	"	—
No. 4 White Linens	2.25	"	3.25
No. 1 White Cotton	4.25	"	4.75
No. 2 White Cotton	3.25	"	3.75
No. 3 White Cotton	2.50	"	3.00
No. 4 White Cotton	1.90	"	2.20
Extra Light Prints	2.00	"	2.40
Ord. Light Prints	1.75	"	2.15
Med. Light Prints	1.55	"	1.95
Dutch Blue Cottons	2.25	"	2.50
French Blue Linens	3.00	"	—
Checks and Blues	2.00	"	—
Linsey Garments	1.90	"	2.00
Dark Cottons	1.50	"	1.60
Old Shopperies	1.30	"	1.45
New Shopperies	1.45	"	1.50
French Blues	2.25	"	2.50

BAGGING

(Prices to Mill, f. o. b. N. Y.)

Gunny No. 1—			
Foreign	Nominal		
Domestic	4.00	@	4.25
Wool Tares, light	4.25	"	4.50
Wool Tares, heavy	4.50	"	4.75
Bright Bagging	4.50	"	4.85
Manila Rope—			
Foreign	—	"	—
Domestic	*5.75	"	—
Jute Threads	4.25	"	4.75
No. 1 Sisal Strings	*4.00	"	—
Mixed Strings	1.00	"	1.20

* OPA Maximum Price.

Old Waste Papers

(F. o. b. New York)

OPA Maximum Prices

No. 1 Hard White Envelope Cuts, one cut	3.37½	@	—
No. 1 Hard White Envelope Cuts	3.12½	"	—
No. 1 Hard White Shavings, unruled	2.87½	"	—
No. 1 Hard White Shavings, ruled	2.50	"	—
Soft White Shavings, one cut	2.87½	"	—
No. 1 Soft White Shavings	2.50	"	—
Soft White Shavings, Misc.	2.15	"	—
No. 1 Fly Leaf Shavings	1.67½	"	—
No. 2 Fly Leaf Shavings	1.12½	"	—
No. 1 Groundwood Fly Leaf Shavings	1.25	"	—
No. 2 Mixed Groundwood Fly Leaf Shavings	.90	"	—
Mixed Colored Shavings	.75	"	—
Mixed Groundwood Colored Shavings	.90	"	—
Overissue Magazines	1.67½	"	—
No. 1 Heavy Books & Magazines	1.57½	"	—
Mixed Books	.85	"	—
No. 1 White Ledger	2.17½	"	—
No. 2 Mixed Ledger, colored	1.87½	"	—
New Manila Envelope Cuttings, one cut	2.87½	"	—
New Manila Envelope Cuttings	2.65	"	—
Extra Manilas	1.85	"	—
Mixed Kraft, Env. & Bag Cuttings	2.75	"	—
Kraft Envelope Cuttings	3.25	"	—
Triple Sorted, No. 1 Brown Soft Kraft	2.50	"	—
New 100% Kraft Corrugated Cuttings	2.25	"	—
No. 1 Assorted Old Kraft	1.75	"	—
New Jute Corrugated Cuttings	.90	"	—
Old Kraft Corrugated Containers	1.50	"	—
Box Board Cuttings	.72½	"	—
White Blank News	1.65	"	—
Overissue News	.85	"	—
No. 1 News	.75	"	—
No. 1 Mixed Paper	.70	"	—
Old Corrugated Containers	.82½	"	—
Mill Wrappers	.85	"	—

Twines

(F. o. b. Mill)

(Soft Fiber)

Coarse Polished—			
India	.21	@	—
White Hemp	.21	"	—
Fine Polished—			
Fine India	.26	"	—
Unpolished—			
Box	.17¼	"	—
Paper Makers	.17	"	—
Tube Rope	.19	"	—
Wall Paper	.20½	"	—
Wrapping	.23	"	—
Soft Fiber Rope	.19	"	—
Cotton	.25	"	—

(Hard Fiber)

Medium Java	.18	"	—
Mex. Sisal	.16	"	—
Manila	—	"	—

PHILADELPHIA

Domestic Rags (New)

(Price to Mill, f. o. b. Phila.)

Shirt Cuttings—			
New White No. 1	.07¼	@	.07½
New White No. 2	.04½	"	.05
Light Silesias	.04½	"	.04¾
Silesias, No. 1	.04	"	.04¼
Black Silesias, soft	.03¾	"	.04
New Unbleached	.07¼	"	.07½
Washable Prints	.03¾	"	.03½
Washable No. 1	.02	"	.02¼
Blue Overall	.04½	"	.05½
Cottons—According to grades—			
Washable shredding	—	"	.01¾
Fancy Percales	.03¼	"	.03½
New Black Soft	.02¾	"	.03
New Dark Seconds	1.75	"	2.00
Khaki Cuttings—			
No. 1 O. D.	.03	"	.03¼
No. 2 Mixed	.02¼	"	.02½
Corduroy	.01¾	"	.02¼
New Canvas	.04¾	"	.05¼
New Black Mixed	—	"	.02½

Domestic Rags (Old)

White No. 1—Repacked	3.80	"	—
White No. 2—Repacked	2.90	"	—
Miscellaneous No. 1	3.20	"	—
Miscellaneous No. 2	2.65	"	—
Thirds and Blues—			
Miscellaneous	1.80	"	—
Repacked	2.20	"	—
Black Stockings— (Export)	Nominal		
Roofing Stock—			
Foreign No. 1	Nominal		
Domestic No. 1	1.55	"	—
Domestic No. 2	1.45	"	—
Roofing Bagging	1.35	"	—
Old Manila Rope	5.75	"	—

Bagging

(F. o. b. Phila.)

Gunny No. 1—			
Foreign	Nominal		
Domestic	3.00	"	3.50
Sisal Rope	3.75	"	—
Mixed Rope	.75	"	1.00
Scrap—			
No. 1	3.25	"	3.50
No. 2	1.75	"	1.80
Wool Tares, heavy	4.00	"	4.25
No. 1 New Light Burlap	3.00	"	4.00
New Burlap Cuttings	3.75	"	4.00

Old Papers

(F. o. b. Phila)

OPA Maximum Prices

No. 1 Hard White Envelope Cuts, one cut	3.37½	"	—
No. 1 Hard White Shavings, unruled	2.87½	"	—
Soft White Shavings, one cut	2.50	"	—
White Blank News	1.65	"	—
Soft White Shavings, Misc.	2.15	"	—
No. 1 White Ledger	2.17½	"	—
No. 2 Ledger, colored	1.87½	"	—
No. 1 Heavy Books & Magazines	1.57	"	—
Overissue Magazines	1.67½	"	—
New Manila Envelope Cuttings	2.65	"	—
No. 1 Assorted Old Kraft	1.75	"	—
No. 1 Mixed Paper	.70	"	—
Box Board Cuttings	.72½	"	—
Jute Corrugated Cuttings	.90	"	—
Overissue News	.85	"	—
No. 1 News	1.00	"	—

BOSTON

Old Papers

(F. o. b. Boston)

OPA Maximum Prices

No. 1 Hard White Shavings, unruled	2.87½	@	—
No. 1 Hard White Shavings, ruled	2.50	"	—
Soft White Shavings, Misc.	2.15	"	—
No. 1 Fly Leaf Shavings	1.67½	"	—
No. 2 Fly Leaf Shavings	1.12½	"	—
No. 1 Groundwood Fly Leaf Shavings	1.25	"	—
No. 2 Groundwood Fly Leaf Shavings	.90	"	—
Mixed Colored Shavings	.75	"	—
New Manila Envelope Cuts, one cut	2.87½	"	—
Hard White Envelope Cuts, one cut	3.37½	"	—
Triple Sorted No. 1 Brown Soft Kraft	2.50	"	—
Mixed Kraft Env. & Bag Cuttings	2.75	"	—
Kraft Envelope Cuttings	3.25	"	—
No. 1 Heavy Books & Magazines	1.57	"	—
New Manila Envelope Cuts, one cut	2.87½	"	—
New Manila Envelope Cuttings	2.65	"	—
White Blank News	1.65	"	—
No. 1 Assorted Old Kraft	1.75	"	—
No. 1 Mixed Paper	.70	"	—
Overissue News	.85	"	—
Box Board Cuttings	.72½	"	—
New Corrugated Cuttings, Kraft	2.25	"	—
Old Corrugated Containers	1.00	"	—
Jute Corrugated Cuttings	1.07½	"	—

Bagging

(F. o. b. Boston)

Gunny Bagging—			
Foreign	(nominal)		
Domestic	3.75	@	—
Sisal Rope No. 1	*4.75	"	—
Sisal Rope No. 2	*4.25	"	—
Mixed Rope	1.35	"	1.50
Transmission Rope—			
Foreign	(nominal)		
Domestic	2.75	"	3.00
Manila Rope—			
Foreign	(nominal)		
Domestic	5.75	"	—
Soft Jute Rope	4.75	"	5.25
Jute Carpet Threads	3.25	"	3.50
Bleachery Burlap	8.50	"	9.00
Scrap Burlap—			
Foreign	(nominal)		
Domestic	3.75	"	4.00
Wool Tares—			
Foreign	(nominal)		
Domestic	3.75	"	4.00
Aust. Wool Pouches	4.65	"	4.87½
New Burlap Cuttings	4.75	"	5.00
Heavy Baling Bagging	4.00	"	4.25
Paper Mill Bagging	2.50	"	3.00
No. 2 Bagging	1.35	"	—*

* OPA Maximum Price.

Domestic Rags (New)

(F. o. b. Boston)

Shirt Cuttings—			
New Light Prints	.04½	@	.04¾
Fancy Percales	.04¾	"	.05
New White No 1	.06¾	"	.07
New Light Flannelettes	.05½	"	.06
Canton Flannels, Bleached	.06	"	.06½
Underwear Cutters, Bleached	.06¾	"	.06¾
Underwear Cutters, Unbleached	.05¾	"	.06
Silesias No. 1	.06	"	.06¼
New Black Silesias	.03	"	.03½
Red Cotton Cuttings	.03½	"	.04
Soft Unbleached	.06½	"	.06¾
Blue Cheviots	.05½	"	.06
Fancy	.02¾	"	—
Washable	.02¾	"	—
Khaki Cuttings	.02¾	"	.03
O. D. Khaki	.03½	"	.03¾
Corduroy	.03¼	"	.03½
New Canvas	.06¼	"	.06¾
B. V. D. Cuttings	.06¼	"	.06¾

Domestic Rags (Old)

(F. o. b. Boston)

White No. 1—			
Repacked	3.80	@	—*
Miscellaneous	3.20	"	—*
White No. 2—			
Miscellaneous	2.65	"	—*
Twos and Blues, Repacked	2.20	"	—*
Old Blue Overalls	2.25	"	2.50
Thirds and Blues, Repacked	2.20	"	—*
Miscellaneous	1.80	"	—*
Black Stockings	3.50	"	4.00
Roofing Stock—			
No. 1	1.55	"	—*
No. 2	1.45	"	—*
No. 3	1.35	"	—*
No. 4	1.35	"	—*
No. 5, Quality A	1.35	"	—*
Quality B	1.20	"	—*
Quality C	.95	"	—*
Old Manila Rope	5.75	"	—

* OPA Maximum Prices.

Foreign Rags

(F. o. b Boston)

Canvas	(nominal)
Dark Cottons	(nominal)
Dutch Blues	(nominal)
New Checks and Blues	(nominal)
Old Fustians	(nominal)
Old Linsey Garments	(nominal)
New Silesias	(nominal)

CHICAGO

Waste Paper

(F. o. b. Chicago)

OPA Maximum Prices.

Shavings—			
No. 1 Hard White Envelope Cuts, one cut	3.37¼	"	—
No. 1 Hard White Shavings, unruled	2.87½	"	—
No. 1 Soft White Shavings	2.50	"	—
No. 1 White Ledger	2.17½	"	—
No. 1 Heavy Books & Magazines	1.67½	"	—
White Blank News	1.65	"	—
Mixed Kraft Env. & Bag Cuttings	2.75	"	—
No. 1 Assorted Old Kraft	1.75	"	—
Overissue News	.85	"	—
No. 1 News	.75	"	—
No. 1 Mixed Paper	.70	"	—
No. 1 Roofing Rags	1.55	"	—
No. 1 Roofing Bags	1.45	"	—